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TOMATO VALUE CHAIN STUDY AND ACTION PLAN

**AGRICULTURAL COMPETITIVENESS AND ENTERPRISE DEVELOPMENT
PROJECT (ACED)**

OCTOBER 2011

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TOMATO VALUE CHAIN STUDY AND ACTION PLAN

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LIST OF ACRONYMS

AAFA	Access to Agriculture Finance Activity
ACED	Agriculture Competitiveness and Enterprise Development Project
ACSA	National Agency for Rural Development
ADP	Agribusiness Development Project
AN	Anenii Noi district
BSPs	Business Support Providers
EU	European Union
FAO	Food and Agriculture Organisation
FL	Falesti district
GlobalGAP	Global standard in Good Agricultural Practices
HACCP	Hazard Analysis and Critical Control Points
HVA	High Value Agriculture
IDSP	Investment Development Support Provider
IPM	Integrated Pest Management
LLC	Limited Liability Company
MAFI	Ministry of Agriculture and Food Industry
MCA	Millennium Challenge Account
MIEPO	Moldovan Investment and Export Promotion Organisation
PHH	Post-harvest Handling
pH	Index presenting the concentration of hydrogen ions in soil/water
RO	Romania
RU	Russia
STTA	Short Term Technical Assistant
TA	Technical Assistance
UNCOMTRADE	United Nations Statistics Division
USAID	United States Agency for International Development
VC	Value Chain
VCSC	Value Chain Support Centre

INTRODUCTION

Background

ACED is a five-year project, co-funded by the United States Agency for International Development (USAID) and the Millennium Challenge Corporation (MCC), and implemented by Development Alternatives, Inc. (DAI) to increase the success of the Moldovan agriculture sector in the production and marketing of high value crops both in the domestic market and internationally. ACED focuses on a limited number of high value agriculture value chains that will take advantage of new programs, supported by MCC, to increase irrigation capacity in the country and provide positive returns to farmers and the rural economy. The program will provide a combination of technical and managerial training, technical assistance and marketing services to strengthen existing value chains and encourage the development of new ones.

Objective

This paper has been prepared to bring together the mass of information that has been gathered with respect to the tomato value chain in Moldova, including information about various end markets, production technologies, post-harvest practices, investment needs, relevant government policy and business practices. This information was carefully analyzed to provide a basis for developing a strategy and action plan that will be useful to the ACED team as it works with tomato producers, input suppliers, traders and other participants to improve the efficiency and enhance the profitability of the value chain and its role as a driver of the Moldovan rural economy.

Methodology

This value chain analysis is based on desk research and interviews with value chain participants, including producers, intermediate traders, exporters, supermarkets, and input suppliers. The data presented in this report primarily come from reports and databases published by the Moldovan National Bureau of Statistics, Ministry of Agriculture and Food Industry and international trade databases – the UN Comtrade, FAOSTAT, and Eurostat.

Data issues

A significant share of domestic market transactions in the tomato value chain is informal where, for the purposes of tax evasion, invoices are not used and therefore, accurate data on sales volumes are not available. For the purposes of this report, where accurate official data were not available, the ACED team developed its own estimates based on various published reports and interviews with producers and other value chain actors.

Structure of this report

This report is divided into two chapters: Chapter 1 - Value Chain Analysis includes the analysis of the structure, production volumes and constraints within the value chain; Chapter 2 – Value Chain Strategy and Action Plan – presents an action plan for addressing the constraints identified by the value chain analysis.

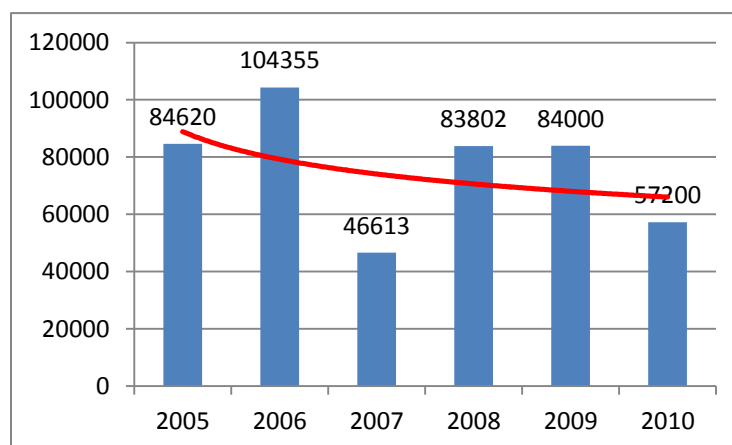
Chapter 1: Value Chain Analysis

Overview of the Value Chain

1.1 End Market Opportunities and Key Market Requirements

In Moldova tomatoes are grown as a key vegetable crop for domestic consumption and exports. In 2010 Moldova produced 57,230 tons of tomatoes; the total area under production of both greenhouse and open field tomatoes was 6,000 ha. During the period 2005-2010 production volumes have fluctuated with an overall decrease trend in production, as shown in the table below (production trend in red). In 2007 a draught occurred and tomato yields suffered due to lack of irrigation. In addition, volumes of tomato production generally fluctuate from season to season, as demonstrated by increase in production from 2005 to 2006 and reduction from 2009 to 2010, and usually reflect the market performance of the previous year. However, occasional fluctuation in production is not an indicator of a long-term trend towards reduced tomato production.

Figure 1. Tomato production in Moldova (2005-2010), tons



Source: Data from Moldova's Ministry of Agriculture and Food Industry Expert 2011, ACED calculations

Out of the total production in 2010, 53,334 tons (93% of total production) were sold fresh and 3,896 tons were processed. Orhei Vit management mentioned that they are exporting 90% of their canned products and the remaining is sold on the domestic market.

As shown in the Table 1, in 2010 the key end market for Moldovan tomatoes was domestic with about 86% percent of total production consumed domestically (either as fresh tomatoes or as processed tomato based products¹) and 14% exported. In addition, Moldova imported 8,743 tons of fresh tomatoes and

¹ In this table the production volume for processed tomatoes indicates the volume of fresh tomatoes that was processed. However, the volumes of processed tomatoes exported and consumed refer to the volumes of final products such as tomato juice, canned tomatoes, ketchup, etc, which do not translate directly into the tons of tomatoes produced. On average, tomatoes constitute about 50% of processed tomato-based products. Other ingredients like water, vinegar, salt, peppers and other account for the other 50% of the content. Therefore the above comparison is not exact.

3,052 tons of tomato based processed products, making the total domestic consumption of tomatoes equal to 57,157 tons of fresh tomatoes and 3,393 tons of processed tomato based products. According to the below analysis, Moldovan production of fresh tomatoes does not meet the total domestic market demand. One of the reasons is that local growers have very limited ability to produce tomatoes outside the high season. Moldova also imports field tomatoes, as well as other vegetables, from Ukraine according to an illegal import scheme². This produce looks nicer, are bigger and more uniform compared to Moldovan field tomatoes. In Ukraine the crops are better maintained and receive a better technology.

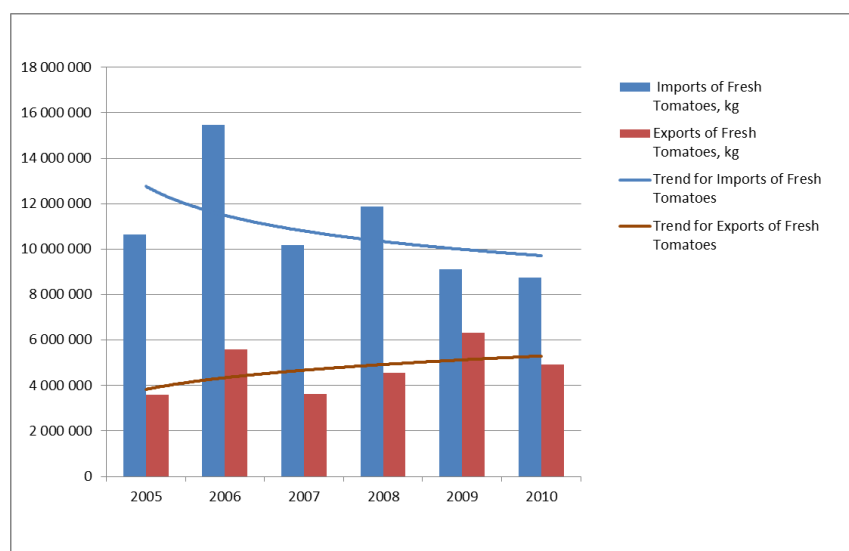
Table 1. Tomatoes Production and Trade Flow

	Produced	Exported		Consumed		Imported		Total Domestic Market	
Tomatoes	tons	tons	value in USD	tons	value in USD	tons	value in USD	tons	value in USD
Fresh	53,334	4,920	\$ 2,164,800	48,414	\$ 12,103,500	8,743	\$6,628,374	57,157	\$18,731,874
Processed	3,896	3,072	\$ 2,548,789	341	n/a	3,052	\$2,891,419	3,393	\$2,891,419
Total	57,230	7,992	\$4,713,589	48,755	\$12,103,500	11,795	\$9,519,793	60,550	\$21,623,293

Source: ACED team analysis based on UN Comtrade and Moldova's Bureau of National Statistics data

Total imports of fresh tomatoes to Moldova have been declining over the period 2005-2010, while exports have shown a slight increase during the same time period. Trends in imports tend to reflect the fluctuation in domestic production. Note that the number reported above for exports might be inflated due to re-exports from Turkey going via Moldova to Russia. Main outsource of tomatoes transiting Moldova territory is Turkey.

Figure 2. Moldova's export/import of fresh tomatoes: general trends 2005-2010



Source: UN Comtrade, ACED calculations

Domestic market

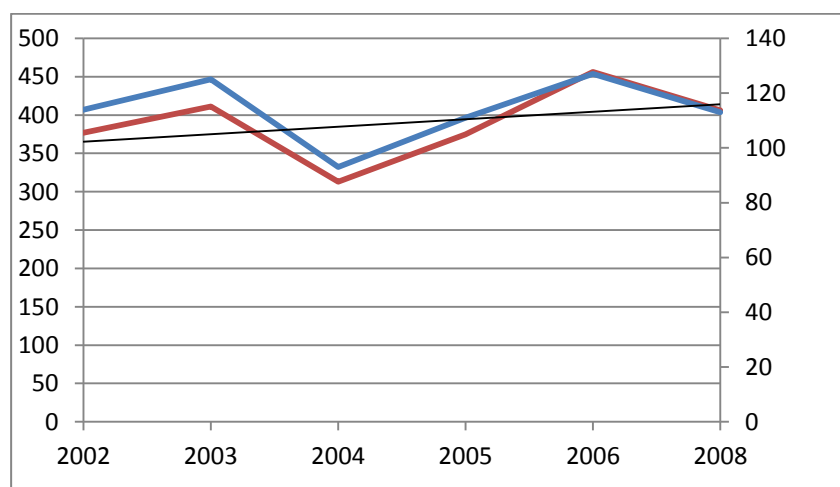
² Products come across the border in minibusses and only pay customs duties on some portion of the produce. The other portion often remains hidden.

Naturally the key end market for Moldovan tomatoes should be the domestic one where the primary market segments for tomatoes is the open air retail market and a much smaller, but growing, supermarket channel. Given Moldova's history of tomato production and the existing domestic market demand for tomatoes, opportunities for import substitution exist when local growers can offer an improved quality and extend their growing season. Currently Turkish tomatoes dictate the price trend for local tomatoes. In the off season, Turkish tomatoes dominate HoReCa and Supermarket channels due to their quality and shelf life. The price of Turkish tomatoes sets a bar for Moldovan ones. For example, Turkish tomatoes can sell for 12 MDL/kg during the transitional season, and Moldovan ones for 7, representing a price to quality benchmark.

In Moldova, annual fresh tomato consumption is about 15 kg per capita. Food expenditures constitute 40% of total living expenses of Moldova's population with 12% of food expenditures spent on vegetables. It is anticipated, as it is across the world that fresh tomato consumption will continue to increase as the culture of consuming fresh vegetables as a healthy food takes hold and as the health benefits of tomatoes become more recognized. This might not result in a visible increase in the local market in the near term, but will likely result in increases in consumption in regional markets. In addition, as incomes increase, it is expected that the population will prefer purchasing fresh rather than processed tomatoes.

The available data show that Moldova's total and per capita vegetable consumption is increasing. Assuming that tomatoes continue to account for about 50% of the total vegetable production, this trend is valid for tomatoes as well.

Figure 3. Moldova's Domestic Total and Per Capita Consumption of Vegetables, kg per year



Source: Data from Moldova's Ministry of Agriculture and Food Industry 2009, calculations by ACED staff.

Competitive position in domestic market:

The main competition in the domestic market is presented by imported tomatoes, primarily from Turkey. In 2010, Moldova spent approximately \$ 6,628,374 importing fresh tomatoes, out of which \$5,442,704 was spent on imports from Turkey. The sales season for greenhouse tomatoes in Moldova is early May to late November, sometimes beginning of December (production starts second half of January and finishes at beginning of December), with open field tomato production taking place from June to late October. Turkish tomatoes are imported from mid-November to June 1st to substitute for the lack of local

production at this time. During the local peak production season Turkish tomatoes are not present in the market, except in unusual cases like when Turkish tomatoes were banned in Russia in 2008 (Fig. 7.). Direct competition between local and imported tomatoes typically takes place during the roughly 10-day period of June and the first 10 days of November when both are offered on the market. When both imported and local tomatoes are present on the market, Moldovan consumers prefer local tomatoes which are believed to be fresher, safer and contain fewer pesticides. This is evidenced by some examples when local traders purchase Turkish tomatoes on the wholesale market, take out the stems and sell them on the retail market as locally produced tomatoes.

Although consumers prefer the taste of local tomatoes, Moldovan tomatoes cannot compete on quality with Turkish tomatoes. Imported tomatoes have better visual appeal due to grading and have a longer shelf life due to use of pre-cooling and being treated with calcium or other firmness enhancers, in addition to the individual qualities of the variety itself. Quality characteristics, such as longer shelf life, are not a factor in the open air retail markets where quality requirements are lower and sanitary and phytosanitary standards are not enforced. In this market channel, local tomatoes can be more competitive than imported. However, the inability to meet quality requirements of local supermarkets, limits local producers competitiveness vis-a-vis imports in this higher value market channel. Other comparative characteristics of local and Turkish tomatoes are shown in the table below.

Table 2. Turkish Tomatoes compared to Moldovan Tomatoes

Price	Taste	Shape	Color	Consistency
For a period of about one week, right at the beginning of the season local tomatoes are 10 - 20% more expensive in retail markets compared to imported Turkish tomatoes. After this period, prices for local tomatoes are 10-20% lower than imported Turkish ones as Moldovan tomatoes flood the market and Turkish imports cease for the summer.	In the Moldovan consumer view, imported tomatoes “have no taste” which is one of the key competitive advantages of local tomatoes.	Imported tomatoes are round. There are no plum tomatoes imported from Turkey. However, there is demand for both shapes in the Moldovan market.	Imported tomatoes have a uniform pale red color. There are no tomatoes of other colors, such as orange and yellow, imported from Turkey.	The common characteristic for all of the imported varieties are greater firmness, compared to local tomatoes.

Consumer preferences:

During the high season domestic consumer demand is not very sophisticated, with consumers generally content with what is available. The price difference in the beginning of season relates to enthusiasm for the re-appearance of local tomatoes and the fact that local buyers believe that the imported tomatoes have no taste.

Demand for specialty varieties of tomatoes, such as cherry tomatoes, is currently limited to supermarkets and HORECA sector. There is currently potential for introducing several new varieties for testing, such as – yellow tomatoes, black tomatoes, heirloom tomatoes, etc. The strategy of introducing new higher value varieties of tomatoes onto the shelves will be discussed with the supermarkets and we anticipate it being possible to work in partnership with them, paired with local farmers introducing changes into their production technology.

Between open field and greenhouse tomatoes the Moldovan consumers prefer open field tomatoes. One main reason is because they can afford them in larger quantities during the high season. However, during

the transition period from greenhouse production to open field production, greenhouse growers often try to sell their tomatoes as open field tomatoes by removing stems and muddying the tomatoes, thus showing the ‘naturalness’ of its origin. Open field small and medium sizes tomatoes are also the preferred choice for making homemade canned products. Traditionally it has become a habit to use such tomatoes in the cuisine so people got used to them. This is not just a cost factor, but consumers prefer open field tomatoes instead of greenhouse produced because they are considered healthier, containing less pesticides and fertilizers. Also the Moldovans think the flavor is much richer and more characteristic to what they have got used through years.

Market opportunities:

Opportunities exist for import substitution in the domestic market focusing on both the open air retail market and the supermarket segments. This can be accomplished by extending the production season for local tomatoes. It is estimated that with slight and not very costly production improvements, such as introducing energy efficient heating, double layer covers, choosing the right varieties, the trading season for local tomatoes can be extended both into spring and into late fall with the first local tomatoes reaching the market on May 1 and lasting until December 1 (Fig. 7.) In this way, local producers will gain almost 2 extra months of product marketing.

In the domestic open air market segment the competition is currently based on price. Quality requirements are not stringent and can usually be met by local producers. There are no specific requirements for shape, product uniformity, visual appeal and shelf life. Transactions in this market segment are informal with no invoices used. Phytosanitary requirements are poorly enforced at the open air market level. Although sanitary inspection authorities provide a receipt for inspection to all who pass through, they are not always conducting the proper range of testing of the products at the wholesale markets before the products reach the retail markets. As a result, a visual inspection by experts as well as the number of people reporting getting sick indicates that produce sold on open air retail markets frequently exceeds acceptable quantities of nitrates, pesticides or other contaminants.

Another issue is that farmers don’t bother getting certificates from the local authorities since they don’t see any commercial value in the open air market. However, those selling directly to supermarkets get the certification done at state SPS laboratories.

Since the entry requirements in the open air market are not stringent and local consumer taste preferences already favor local tomatoes over imported, there is an immediate opportunity to substitute for imports by increasing the local production season beyond November through improvements in greenhouse technology, minimizing production costs and increasing yields.

The domestic supermarket channel is where competition with imports is strongest and quality requirements are strict. That makes competing in this market channel a longer term goal for local producers. Tackling that will require improved quality and sufficient volumes supplied on a sustained basis, which will require pre-cooling/cold storage, grading, and stronger cooperation among producers. Farmers need to respond to the requirements of supermarket suppliers for on time delivery, formal invoices, consistency of supply, and uniformity and longer shelf life of the product. Specific requirements of domestic supermarkets include:

- Longer shelf life -- at least 1 week
- Seasonal contracts and ability to deliver on time and to volumes contracted, on a consistent basis
- Invoiced transactions
- Ability to accept post-payment terms of 14 days

- Quality certifications and compliance with SPS standards
- Single point of transaction (which requires farmer organization and strong relationships between growers and distributors/supermarket suppliers)

Export markets

Moldovan exports of tomatoes as percentage of total production are small (about 1%). In 2010 Moldova exported 4,920 tons of fresh tomatoes and 3,072 tons of processed tomato-based products, which mainly included tomato juices, canned tomatoes, tomato paste, and ketchup. 90% of Moldovan production of processed tomato products is exported, primarily to Russia, Belarus and Kazakhstan. The fastest growing market for fresh and processed tomatoes is Russia. So far the Belarus market is smaller in number of population and slightly declining, nevertheless, it is the biggest consumer market for Moldovan tomatoes. UN Comtrade data for processed tomatoes are included in the Annex A, since this analysis is primarily focused on fresh tomatoes.

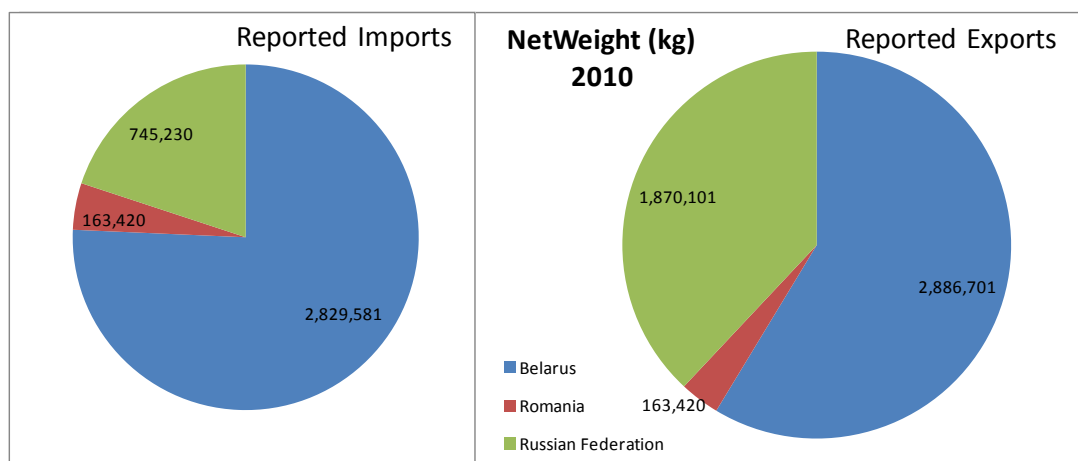
Moldova's key export markets for fresh tomatoes are Belarus, Russia and Romania. In the UN Comtrade database, there is a discrepancy between Moldova's reported exports to these three markets, and reported imports by these countries from Moldova. The data differences are due to re-exports by Moldova, likely of Turkish tomatoes. The most significant difference is with respect to the Russian market which indicates a larger potential market for Moldovan producers, if they were to substitute the re-exports with local production. The figure below shows a comparison of reported imports and reported exports of tomatoes from Moldova.

Figure 4. Distribution of fresh tomatoes exports from Moldova in 2010, as reported by importing country and as reported by Moldova for Tomatoes, fresh/chilled [070200]

Year	Trade Flow	Reporter	Trade Value	Net Weight (kg)	Trade Flow	Trade Value	Net Weight (kg)	Variation (value / kg)	
2010	Import	Belarus	\$1,295,600	2,829,581	Export	\$1,333,109	2,886,701	\$37,509	57,120
2010	Import	Romania	\$112,238	163,420	Export	\$83,628	163,420	(\$28,610)	0
2010	Import	Russia	\$508,836	745,230	Export	\$1,234,694	1,870,101	\$725,858	1,124,871

From the above table we can see that Moldova has reported exports of roughly 57 truckloads (around 1125 tons) of tomatoes to Russia while Russian statistics show imports of less than half this amount from Moldova. That probably has to do with the fact that in the Transnistrian region there are uncontrolled business operations that may account for the surplus. The value chain analysis team verbally received information that trucks with tomatoes and citrus are being imported heavily to that region, which is not consistent with the consumption, meaning that some re-export operations are likely running through that area.

Figure 5. Visual comparison of respective reporting country's imports compared to Moldova's reported exports



Source: UN Comtrade

For the purposes of this analysis we use the reported data on imports from Moldova as shown in UN Comtrade database. Although currently Belarus is the largest market for Moldovan fresh tomatoes in terms of volumes, analysis of market data presented below shows that Belarus imports of fresh tomatoes declined from 2009 to 2010 and Moldova's share of this market declined slightly as well. For the year 2011 we lack data but from discussing with traders and farmers we draw the conclusion that for greenhouse tomatoes it was a difficult year, because of the volatility of Belarus market. While Moldovan exports to the Russian market are currently smaller in terms of volume, Russia's overall imports of fresh tomatoes have been increasing (indicating a growing market) and Moldova's share of this market has been showing a slight increase as well. These trends indicate a need for better understanding of the requirements of the Russian market and analysis of potential opportunities for Moldovan producers in this market. Romania's imports of Moldovan tomatoes are small.

Table 3. Belarus Imports of Fresh Tomatoes

	Belarus Imports of Fresh Tomatoes					
	World		Moldova		Moldova's share	
	value	kg	value	kg	value	kg
2005	\$10,942,500	20,639,040	\$1,088,600	2,640,272	9.9%	12.8%
2006	\$14,113,800	28,174,484	\$1,322,700	3,805,539	9.4%	13.5%
2007	\$13,755,900	29,003,064	\$826,700	3,278,209	6.0%	11.3%
2008	\$22,703,500	28,838,162	\$1,426,700	3,819,998	6.3%	13.2%
2009	\$15,478,300	34,791,375	\$1,391,300	4,201,098	9.0%	12.1%
2010	\$18,807,500	25,066,021	\$1,295,600	2,829,581	6.9%	11.3%

Source: UN Comtrade

Table 4. Russia Imports of Fresh Tomatoes

	Russia Imports of Fresh Tomatoes					
	World		Moldova		Moldova's share	
	value	kg	value	kg	value	kg
2005	\$216,170,125	351,831,732	-	-	0.0%	0.0%
2006	\$300,944,230	413,597,048	-	-	0.0%	0.0%
2007	\$534,742,408	550,528,118	\$48,324	92,930	0.0%	0.0%
2008	\$628,923,467	673,894,332	\$384,264	771,705	0.1%	0.1%
2009	\$648,885,056	694,386,351	\$631,788	1,108,487	0.1%	0.2%
2010	\$773,582,210	699,282,212	\$508,836	745,230	0.1%	0.1%

Source: UN Comtrade

Table 5. Romania Imports of Fresh Tomatoes

	Romania Imports of Fresh Tomatoes					
	World		Moldova		Moldova's share	
	value	kg	value	kg	value	kg
2005	\$13,807,889	52,694,927	\$185,402	753,653	1.3%	1.4%
2006	\$15,958,574	51,428,924	\$6,924	45,500	0.0%	0.1%
2007	\$75,578,132	71,059,835	\$15,536	19,030	0.0%	0.0%
2008	\$70,840,839	66,017,143	-	-	0.0%	0.0%
2009	\$41,397,537	40,874,441	-	-	0.0%	0.0%
2010	\$59,120,717	60,765,826	\$112,238	163,420	0.2%	0.3%

Source: UN Comtrade

Competitive position in export markets (Belarus, Russia):

In export markets, such as Belarus and Russia, Moldovan tomatoes are sold in the open air wholesale market segment which primarily supplies the open air retail markets. Moldovan presence in the higher value and rapidly growing supermarket segment is currently almost non-existent due to inability to meet quality and volume requirements of supermarket buyers.

Currently Moldova competes on price due to the preferential tariff regime for Moldovan exports to CIS countries, as compared to other exporters, shown in the table below. In addition, in CIS consumers still prefer the taste of Moldovan tomatoes. This is likely to change, however, as consumers get used to higher quality products from other countries. Without tariff advantages (listed in table below), Moldovan producers would need to drastically improve the quality of product, taste, and consistency of supply volumes in order to be competitive.

Table 6. Customs Tariffs at Russian border (indicative prices) for fresh/chilled tomatoes

Period	Price, USD		
	CIS	Other Countries	Poland

01 JAN – 31 MAR	1.05	1.58	1.47
01 APR – 30 APR	1.05	1.31	1.31
01 MAY – 14 MAY	1.05	1.31	1.31
15 MAY – 31 MAY	1.05	1.31	1.31
01 JUN – 30 SEP	0.63	1.31	1.05
01 OCT – 31 OCT	0.58	1.31	1.00
01 NOV – 20 DEC	1.05	1.58	1.47
21 DEC – 31 DEC	1.05	1.58	1.47

Source: Parma Ltd. (Russia), ACED EMS 2011

At the border with Russia, the indicative pricing used for import paperwork for tomatoes from the CIS is kept lower than for other non-CIS countries, helping Moldovan growers get to market. This means that the costs of trade are lower for Moldovans, as taxes are collected on this lower indicative price.

Market opportunities:

Immediate opportunities exist to improve the competitiveness and reputation of Moldovan tomatoes in the wholesale market segment in Russia and Belarus. To remain competitive in this segment over the long term, Moldovan tomato producers and exporters need to find cost effective methods of increasing total production volumes by increasing yields, extending the season, reducing post-harvest losses, capitalizing on economies of scale and improving the quality of the produce. In particular, greenhouse growers should increase their premium returns in the early market before the open field tomato harvest begins. This will require grower consolidation to meet volume requirements, as well as quality improvements to ensure:

- Longer shelf life of at least 1 week
- Product uniformity and visual appeal (lack of visual defects)
- Compliance with SPS standards

Russia and Belarus are not the only markets that Moldova has to look at, although these are quite important ones at the moment. There are other countries to the North and North-West that could be interested in Moldovan tomatoes such as Poland, the Baltics, Norway and Sweden. As the quality and reputation of Moldovan tomatoes improves, Moldovan producers will be able to position themselves as suppliers to the growing and higher value supermarket channel by developing relationships with importers and traders in export markets that supply supermarkets. Moldovan producers will need to meet their stringent requirements for quality (sizing of tomatoes, uniformity of varieties delivered), consistency of supply and volumes, and accept post-payment terms of 14 days. Understanding the unique requirements of the supermarkets in each of the target markets and how they change over time is critical.

The ACED Russia end market study provides an in-depth understanding of the logistics and dynamics of the Russian Market. That study did not focus on Tomatoes due to the limited potential for exports there in the near term. The other most recent studies of the Belarus and Russia tomato markets date back to 2005 and 2006.³ Market analysis in Belarus (the biggest Moldovan export market) concluded that:

- Packaging used by Moldovan exporters does not fully comply with the requirements of Belarus importers or retailers (especially supermarkets). Tomatoes originating from Moldova are packed in wooden and plastic boxes, while Belarus importers prefer non-returnable 5-7 kg carton boxes.

³ “The Belarusian Market for Tomatoes”, USAID/CNFA Agribusiness Development Project, July 2006 and “Tomatoes on the Russian Market”, USAID/CNFA Agribusiness Development Project, May 2005

However, in recent discussions with the ACED team some exporters suggested that the carton boxes are no longer required and that wooden boxes with one layer of tomatoes are preferred.

- Requirements for product visual appearance in 2006 included preference for tomatoes with diameter in the range of 50-60 mm. Tomatoes needed to be ripe, sound, preferably with peduncle (stem) attached, free of damage caused by frost and free from soil dust.

In respect to the EU market, changes resulting from the signing of the Free Trade Agreement will be watched as a strategic opportunity and will be investigated for the purpose of potential exports of fresh tomatoes and other vegetables. As for the growers this represents a huge opportunity with the opening of a big market with a big potential of absorption, high purchasing power, and a relative stability of prices. At the same time one should consider that the competition in this market will be played as well on the home 'field' – meaning that imports of fresh produce from EU will also come to Moldova and compete here against local tomatoes.

At present, Moldova has a unique position in comparison to other neighbor countries – climate, participation in important Trade agreements with the neighbors in the East and in the West. Since its export already benefits from a series of preferences in the majority of surrounding markets, this is generating a competitive advantage to the local producers. Taking into account the small domestic market it means that agriculture will still generate most of Moldovan exports in the coming 10 to 15 years.

The Annex B.1 provides a list of towns and proximity to Chisinau throughout Europe, from West up to Ural Mountains. The analysis of the respective table shows that Moldovan exports to the Russian market travel much farther than important markets which are situated closer, in the western part of Europe. The major constraints stopping Moldovan exports of tomatoes to EU are the low volumes, insufficient quality / no certification and relative high costs of production. Currently exported tomatoes are of lower quality if compared with the tomatoes of competing countries such as Turkey and Spain. Moldova is has attractive position, with remarkable logistics connections. In fact, Chisinau is located along the Pan-European Corridor IX, which is 3400 km long, connecting Helsinki to Alexandroupoli from North to South, via Vyborg - St. Petersburg - Pskov - Gomel - Kiev - Lyubashivka - Chisinau - Bucharest - Dimitrovgrad and through 3 additional branches (see the map displayed in the Annex B.2). Corridor IX crosses Moldova from East to West and finds its major hub in Chisinau.

An interesting point could be observed when analyzing German imports of tomatoes. Germany is importing tomatoes from quite remote areas, much farther than Moldova. This one could be an opportunity that needs a more in-depth analysis for establishing potential new alternative export markets.

Processed tomatoes:

In 2010 Moldova exported 3072 tons of processed tomato-based products to Russia, Belarus and Kazakhstan. Although a small share of total domestic production, tomato processing industry presents a market outlet for Moldovan producers. Interviews with processors indicate a growing need for consistent supply by the producers and willingness to develop contract relationships with farmers. Processors report underutilization of their production capacity due to difficulty getting reliable and sufficient supply of product from growers. The challenge is inconsistency of supply on the farmer side, side selling, and lack of long term relationships between producers and processors. This presents an opportunity for growers to diversify their markets and create business models that limit reliance on open air markets alone. To understand the dynamics and requirements of the processing value chain, as well opportunities to increase value added and increased benefits to tomato producers, ACED plans to carry out a separate study of the tomato processing value chain. Meetings to this end have already begun.

1.2 Production Overview

The total area of tomatoes planted in 2010 amounted to 6000 ha. The total volume of production of tomatoes in 2010 was 57,230 tons with average productivity of 9.53 ton/ha (explored in more detail below).⁴ Two production methods are used: greenhouse and open field. The main production season for open field tomatoes runs from June till late October. Greenhouse tomatoes are typically produced from end of May/ early June (depending on the year's weather) to end of November. During the next phase of work, ACED will identify which growers have the ability and desire to extend their season to use these growers as a role model for others.

Different varieties are produced and there is a wide variation with respect to shape and color. Round-shaped and plum tomatoes account for most of the production with very small amount of specialty cherry and vine tomatoes produced. Local consumers prefer round tomatoes for fresh consumption. A smaller number of consumers also like to consume plum tomatoes fresh; however, plum tomatoes are mostly used in industrial and domestic processing, due to their low water content, lack of seeds, and poor transportability (lack of firmness). In greenhouse production, round tomatoes account for 90% of production, and plum tomatoes for 10%. Plum tomatoes are mostly grown in open field. Small quantities of cherry and vine tomatoes are produced for niche markets. However, domestic demand for this kind of tomatoes is very low, limited mainly to supermarkets and HORECA. In terms of color, most tomatoes are red with small quantities for orange, yellow, rose and black tomatoes produced mainly by non-commercial growers. These types of tomatoes are supplied mainly to restaurants.

Tomato and vegetable production is concentrated in central eastern Moldova along the Dniester river 50-70 km east of Chisinau where several production "clusters" exist. Short descriptions of these tomato production clusters are presented in the table below.

Table 7. Description of main tomatoes production areas in Moldova

Location	Number of producers	Total covered area, ha	Estimated quantity produced, tons	Varieties (if known)
Dubasarii Vechi commune, Criuleni district	3600	150	13500	Cristal F1, Tolstoy F1, Fantazio F1, Izmir F1, Ivet F1, Abbelus F1
Speia commune, AN	31	37	4400	Cristal F1, Izmir F1, Ivet F1, Abbelus F1
Pirita commune, Dubasari district	600	19	1825	Abelius F1, Izmir F1, Ivet F1
Toxobeni commune, FL	127	14	1050	Zagadka F1, Sanika
Gura Bicului commune, Dubasari district	69	13	975	Beriliu F1, Abelius F1, Lilius F1

Source: Protected cultivation of vegetables in Moldova: Census Report, 2009 and ACED surveys during the Training Program in vegetable production 2011

Open field tomatoes: The total area of open field tomato production is 5,711 ha⁵. Ministry of Agriculture and Food Industry (MAFI) statistics indicate that open area tomato growers with more than 10 ha are managing a total of 1,095.6 ha. No data is available on the typical size of open field tomato growers. Open field tomatoes are mostly produced for industrial processing, with the round small and medium-

⁴ This includes both greenhouse and open field tomatoes, with much higher productivity of greenhouse production and a lower productivity of open field production. See comparison of average yields per hectare for these two production methods below.

⁵ Since the total area of the protected area of tomatoes production is estimated as 289 ha and a source from the Ministry of Agriculture and Food Processing is stating the total area of tomatoes production equal to 6000 ha (2010) then remaining area of 5711 ha will be open field area.

sized tomatoes used for canned products in jars, and plum tomatoes – for tomato juice, ketchup, and paste.

Greenhouse tomatoes: Plastic and glass covered greenhouses are used for tomato production by 7,986 farmers that own 289 ha of protected area, 40 producers use glass greenhouses and the rest – plastic covered frames. Interviews with growers from different production areas across Moldova suggest that greenhouse tomato growers are able to get yields as high as 180 - 250 tons per ha. An estimate of 200 tons/ha is used in the table below.

2010 data	Greenhouse tomatoes	Open field tomatoes
Number of farmers	7986~	n/a
Hectares planted	289 ha~	5711 ha
Volume produced	57,800 tons^	28,300 tons
Yield per ha	200 tons^	9.4 tons (official statistics) 30 tons (ACED estimates based on farmer interviews)^
Production season	May-November	June-October
Number of crops per season	1-3 crops	1 crop
Turkish productivity yield/ ha	170 (Antalya 2006)*	54 tons (2006 approx. average)*

MAFI Official Statistics 2010

*G. Keskin, et al. An Analysis of Tomato Production Cost and Labor Force Productivity in Turkey

^ACED estimations based on farmer interviews. In the case study regarding Puhaceni village the yield was 230 ton/ha

~CNFA Census Report On Protected Area Production

52% of greenhouses growers cultivate only one crop per year. Another 36% grow two crops per season and 12% - three crops. In the case of a protected area with 2 production cycles:

- Production cycle I starts in January with the preparation of the seedling facility. Harvest starts during the third 10-day period of May and finishes during the second 10-day period of July.
- Production cycle II starts during the second 10-day period of July with planting. Harvesting starts during the first 10-day period of September and finishes during the third 10-day period of November.

As illustrated in the production cycle chart below, there is a time overlap in production cycle of protected and open area produced tomatoes that starts in the middle of July and finishes at the beginning of September. There is also a period when both local and imported tomatoes directly compete on the market. Industry experts estimate that the local production season can be extended with the first local tomatoes reaching the market on May 1, lasting until December 1.

Figure 6. Production cycles for greenhouse and open field tomatoes

Production component	Jan			Feb			Mar			Apr			May			June			July			Aug			Sept			Oct			Nov			Dec		
	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III			
Preparation of the seedling production facility																																				
Procurement of inputs (seeds, substrate)																																				
Sowing																																				
Arrangement of pallets in the seedling pr. Facility																																				
Irrigation of the plants till repication																																				
Prickling out																																				
Care of the seedling (irig., fert., protection)																																				
Planting																																				
Installing the irrigation system																																				
Breaking young vines																																				
Training the plants																																				
Irrigation and fertilization																																				
Harvesting Tomatoes of I Cycle																																				
Sowing for II cycle																																				
Prickling out																																				
Taking out plants from I cycle																																				
Planting for II cycle																																				
Installing the irrigation system, mulch																																				
Irrigation and fertilization																																				
Harvesting Tomatoes of II Cycle																																				
Taking out plants from II cycle																																				
Harvesting (open field from seedling)																																				
Harvesting (open field from seeds)																																				
Presence of Import Tomatoes on the Market																																				

2. Value Chain Structure

2.1 Channels

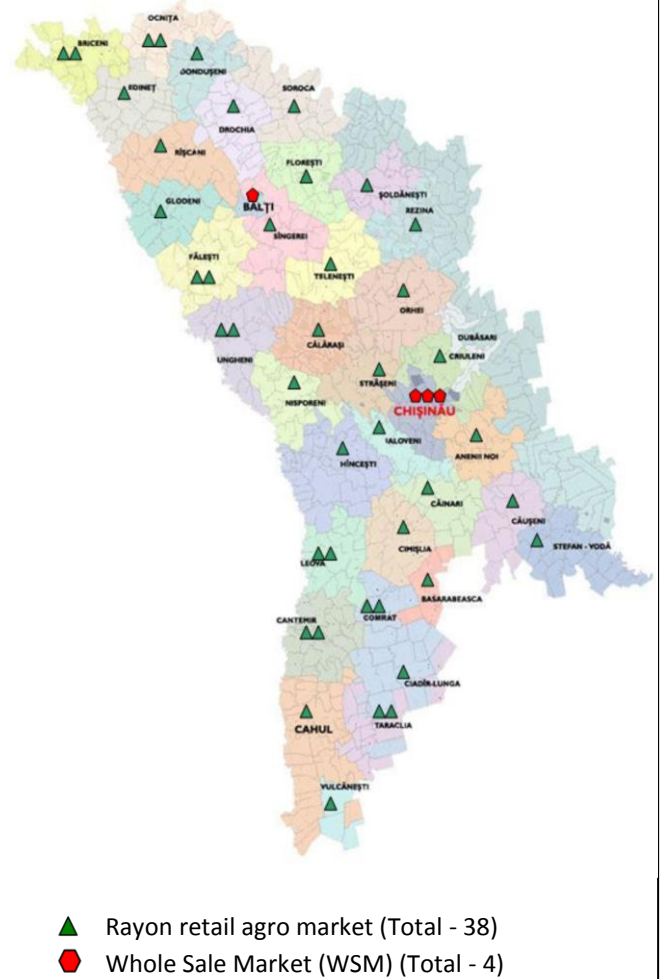
Moldovan tomatoes reach the final consumer through several channels, shown in the value chain map below, which are defined by the way the retail distribution channels in end markets are currently structured. Processed tomato-based products are mostly exported, while fresh tomatoes are mainly consumed in the domestic market. Retail distribution channels in both domestic and key export markets (Belarus, Russia and Romania) are organized in a similar way, however for the purposes of this value chain map export market is presented as one channel due to the small size of exports overall.

Channel 1: Domestic open air retail market channel. Open air markets currently dominate the retail channel for fresh tomatoes in Moldova in terms of sales volume. It is estimated that around 80% of total domestic sales of fresh and processed tomatoes take place through this channel. However, this channel has also been shrinking in terms of overall food sales volumes by about 3-5% annually and this trend is projected to continue as consumers increase the share of their total shopping done in modern supermarkets.

Since open air markets handle large volumes of produce, competition is high and sale prices are low compared to other channels. Quality requirements for tomatoes in this channel are not sophisticated and competition is mainly based on price. Consumers in this segment choose the product that they feel offer the best value proposition (price in relation to appearance). The average retail price for tomatoes in an open-air retail market ranges between 3 and 4 MDL/kg during the high season. This price can't be used as a set signpost, but it is often pronounced by growers themselves when they trade in the market. Transactions in this channel both between producers and traders, and with consumers are mostly informal, with no invoices or receipts used. Significant issue also is the lack of enforcement of sanitary and phytosanitary standards. The testing that is performed on the spot is quite a superficial one, mainly testing for nitrates, and even after positive results rarely would action be taken by market authorities, such as expelling the respective offending growers. Consumers, however, prefer to purchase tomatoes in open air market due to an overall perception that the produce there is better quality and fresher than in supermarkets where produce stays on the shelf for a longer time.

There are 4 permanent whole sale markets in Moldova (3 in Chisinau and 1 in Balti) that supply 138 open air retail markets across the country (38 at the rayon level and 100 local markets, including 12 in Chisinau). At the height of the production season temporary wholesale markets are also established in each municipality where traders and especially local producers sell their produce from minibuses and

Figure 7. Production cycles for greenhouse and open field tomatoes



cars. At the local open air markets, growers usually sell their produce directly, while at the rayon and Chisinau markets the product is supplied primarily by minibus traders who buy tomatoes from the wholesale markets and directly from the farmer's gates. Growers' access to open air markets is limited. In cases when individual farmers bring the produce to the open air retail market to trade directly, they either use their own means of transportation or rent a minibus, sometimes individually or together with a group of farmers.

Channel 2: Domestic supermarket channel. Major supermarket chains in Moldova include Fourchette, Green Hills, N1, Fidesco, Metro Cash & Carry, Cvin, Linella, and Everest. Fruit and vegetables occupy less than 5% of the vending space within a typical Moldovan supermarket. This percentage is lower in the case of convenience stores or local groceries⁶. However, the supermarket channel has been growing at about 3-5% annually as a food sales outlet and is projected to continue to grow. According to some food distributors' estimates, about 10-20% of consumers buy their groceries in supermarkets. There are over 100 supermarkets in Moldova with the majority concentrated in larger districts. Supermarkets sell both local and imported fresh tomatoes and tomato-based processed products. This channel is the main sales channel for processed tomato products. In addition, imports account for about 70% of supermarket's total fruit and vegetable turnover.

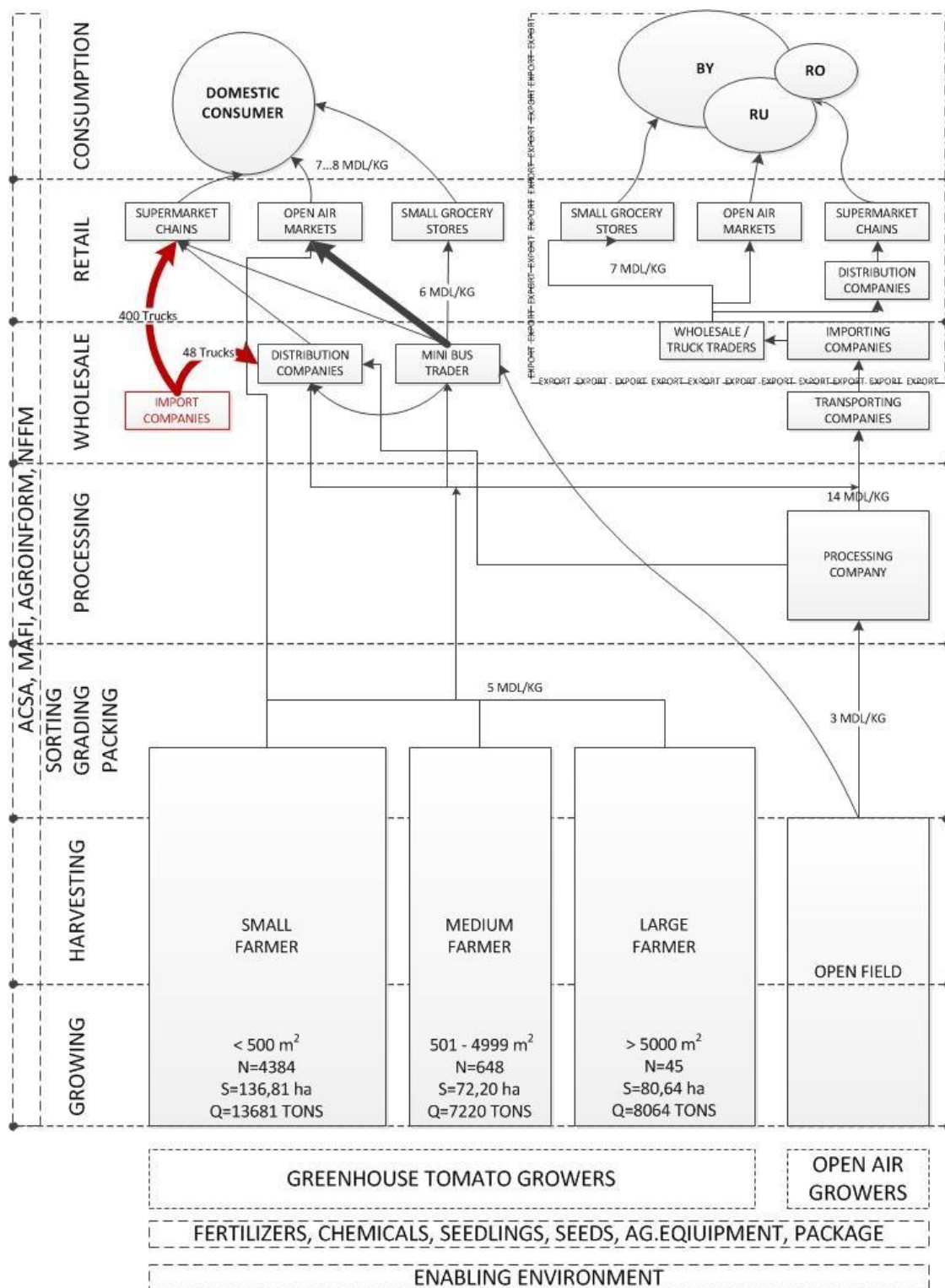
Supermarkets usually source local fresh tomatoes from distribution companies and rarely minibus traders who purchase produce directly from growers. Imported tomatoes are purchased from distributors and often directly from importers. Processed tomato products are sourced primarily from distribution companies. The average price for fresh tomatoes in supermarkets is between 7 and 8 MDL/kg, sometimes even 10 MDL. This channel is the most regulated one in terms of quality, sanitary standards and supplier requirements. Local producers usually cannot meet the volume requirements, delivery schedules, and product standards established by the supermarkets. In order to access this channel, producers need to improve product quality and consistency of production volumes and establish relationships with distributors and traders that supply supermarkets, as supermarkets are looking for consistent supply from a limited number of trusted suppliers. This is also the channel where competition from imports is the strongest.

Channel 3: Domestic small grocery stores. This channel includes small local grocery/convenience stores and kiosks that trade smaller volumes and offer less variety at prices only 0.5-1.0 MDL/kg higher than the open air retail markets. This channel serves consumers who are looking to purchase a mix of different food products and beverages in one nearby location, in addition to fresh produce. There are over 1,000 such stores in Moldova. According to some distributors' calculations, 20-40% of household purchases are made at these stores that are conveniently located throughout the residential areas. Many of these stores do not offer a full range of fruits and vegetables which occupy less than 3% from the total shelf space.

Channel 4: Export markets. A small share (about 1%) of fresh tomatoes produced is exported. However, 90% of processed tomato-based products are exported with only 10% sold in the domestic market. Moldovan fresh and processed tomatoes reach export markets primarily through traders and a few large growers exporting directly. They use services of transportation companies and specialized companies in export markets that offer customs clearance services. After passing the customs procedures traders bring the produce to wholesale markets in Russia and Belarus where they compete primarily on price. Meeting the sanitary and phytosanitary standards is the primary requirement in this market segment. To supply the supermarkets in these markets, producers would need to establish relationships with traders in export markets that supply supermarkets, as well as meet the requirements for quality and supply volumes.

Figure 8. Moldova's Fresh and Processed Tomato Value Chain Map

⁶ Fresh Fruit and Vegetable Market In Moldova: FACTS & FIGURES, BizGates, 2010



2.2 Functions and Actors

The majority of **greenhouse tomato growers** are small farmers with individual production areas of less than 500 m². The total number of small growers is 4,384 managing a total of 136 ha. In addition, there is an estimated 648 medium-sized growers with production areas of 500-4,999 m² who manage a total of 72 ha of protected area. Large growers with production area more than 5,000 m² number 45 farmers and manage about 80 ha of protected area⁷.

Open field tomatoes growers manage a total of 5,711 ha. Although data on the total number and size characteristics of open field tomato growers are not available, according to Ministry of Agriculture and Food Industry 1,095.6 ha are managed by farmers owning 10 ha or more.

Harvesting of fresh tomatoes in case of small growers is done directly by producers without hiring any outside labor. Medium-sized growers hire about 50% of their labor force on a temporary basis, while large growers and open field growers usually hire 100% of their labor force on a seasonal part-time basis. Labor cost is \$6-9/day.

Basic sorting and grading are done manually by the growers before the produce is transported. Traders and exporters are asking for 3 or 4 categories of tomatoes and growers grade them accordingly. Exporters frequently complain of bad quality and lack of uniformity of tomatoes when growers put the poor quality tomatoes at the bottom of the wooden crates in which tomatoes are transported.

The **Post-harvest handling** node of the tomato value chain is missing a warehousing function with the ability to extend shelf-life. Currently there aren't any pre-cooling/cold storage/packing facilities for tomatoes. A cold storage facility (including a forced-air cooling system) would extend the shelf life of the produce, and allow for storing tomatoes during the peak season when price is low, and provide the opportunity to meet an extended supply calendar required by supermarkets. Red tomatoes can be stored for 4-4.5 weeks in cold storage⁸ allowing for the second greenhouse harvest (Nov.) to be extended into December, substituting for Turkish imports which currently arrive in late November. Furthermore, proper packing, grading and sorting at such a facility will allow boxing of standard quality and uniform tomatoes. The best quality boxes can go to local supermarkets and export. Last, truck sourcing at the packing & cooling facility will be more efficient than the current procedure of going to the village for couple of days and negotiating with and getting certificate of origin for many different farmers.

Women are the main labor force involved in all the stages of the tomato production process from planting to manual harvesting and grading, processing and to a lesser extent in greenhouse and irrigation construction. Although very few, there are examples when a woman is leading a vegetable marketing coop (such as Ala Novac, from Dubasarii Vechi village, a greenhouse tomato producer also).

Intermediaries: Before reaching the final consumer, tomatoes go through a set of intermediaries who act as aggregators or transporters to end markets. Small growers frequently sell their tomatoes at regional markets directly using their own transportation. Medium-scale growers usually sell their produce at the farm gate to traders who transport it by minibuses and sell on the wholesale or retail market. Large growers mostly sell to traders that either sell on wholesale markets or export. There are some instances when large growers export directly.

⁷ Protected cultivation of vegetables in Moldova: Census Report, CNFA, 2009

⁸ http://nhb.gov.in/bulletin_files/vegetable/tomato/tom009.pdf

- **Traders (mini-bus and truck traders):** The largest volume of domestic tomato sales goes through traders, who operate only on the local market supplying mainly the open air market channel, but also some supermarkets and small grocery stores. It is estimated that total number of minibuses used in the season is 250 - 300 units. Traders make sporadic transactions when they see a market opportunity, and rarely have long-term relationships with particular farmers. Traders usually have a maximum of 3 days to sell the product. On the fourth day of trading the risks are very high that the produce will spoil.
- **Distribution companies:** Distributors usually buy tomatoes from growers and supply supermarkets and small grocery stores. These companies are performing sorting, grading and packaging of tomatoes to meet supermarket requirements and usually make a margin of 1 leu per kilo of packaging. To meet supermarket requirements for steady supply, distributors act as consolidators of produce from a large number of small producers. The main distribution companies for fresh vegetables are Speranta LLC and Safran LLC with the second having its own vegetable production. In addition, there are several distributors of processed tomato products, such as Le Bridge LLC and Unilever LLC, which distribute the products of the main processors such as Orhei Vit JSC, Natur Bravo JSC, and Alfa Nistru JSC.

Importers: Imports of fresh tomatoes are performed by companies owned completely by, or in partnership with, Turkish businessmen located in Moldova. There are about 50 of such importing companies in Moldova. Some importers sell to distributors, but mainly they supply supermarkets directly. Some supermarket chains as Metro, Fidesco, and Fourchette also run their own import activities for fruits and vegetables.

Processors: Processing companies are exporting 90% of their production to Russia, Belarus and Kazakhstan with the remainder being sold in the local market, including an estimated 2-3 % through the supermarket chains. The processing industry is represented by three large companies: Orhei-Vit, Alfa-Nistru, and Natur Bravo that own six processing facilities located in northern, central and southern parts of the country (Orhei, Soroca, Ungheni, Cupcini, Falesti and Causeni). Orhei Vit produces juices on a franchise basis for the Sandora brand. Processors are collecting fresh products directly from the field tomato growers. However, they are experiencing difficulty getting sufficient supply from growers on a consistent basis therefore competition among processors is increasing. Processors are trying to develop contract based relationships with farmers, but even in cases when a contract is signed, processors report that farmers often choose to side-sell if the market price is more favorable. One of the problems Orhei Vit pointed out was that they had problems with cucumber deliveries and could not source the necessary amounts for existing export orders.

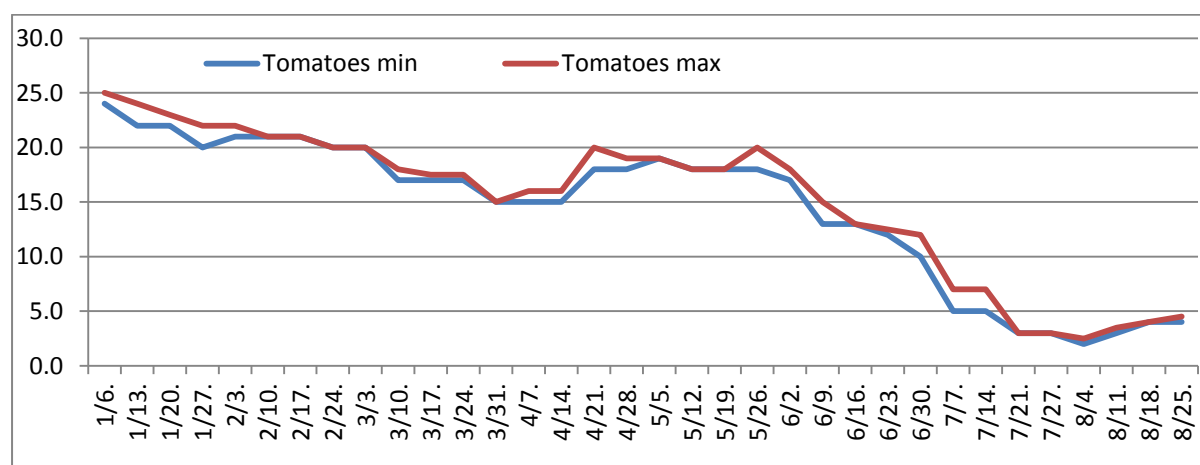
ACED has begun to investigate more the respective processing schemes, how it really works and how it could realistically work better since each party has complaints. This learning process will continue as we work further with the sector, especially as we work with production clusters of open field vegetables such as Edinet, Orhei, and Ungheni. The processing sector is rapidly becoming more competitive as processors introduce new technologies to optimize product quality and production efficiency. Processors are investing in new equipment, more energy efficient equipment, calibrating lines, and packaging and labeling of the final produce. Today, about 25 small and medium-sized companies are equipped with the most modern and highly productive equipment. About 10 medium and large-scale fruit dryers and 3 flash freezing facilities have emerged during the last few years. Processors interviewed for this study have expressed interest in developing new supply mechanisms with growers (similar to contract farming) to ensure consistent supply of raw material.

2.3 Vertical and Horizontal Linkages

Analysis of value added

To understand the power dynamics within the value chain it is important to analyze the value distribution. Due to seasonality of tomato production the price of fresh tomatoes varies throughout the year as is shown in Fig. 9. During the period from mid-November to June 1st, when local tomatoes are not produced and imported tomatoes arrive in the market, the price is higher (due to import taxes and transport costs incurred by importers.) In winter the retail price for fresh greenhouse tomatoes can be as high as 20 MDL/kg and in May around 13 MDL/kg. When local tomatoes are in season, the average retail price for fresh tomatoes is 6-7 MDL/kg for greenhouse tomatoes and 4-5 MDL/kg for open field tomatoes.

Figure 9. Variation of tomatoes price on the local market /greenhouse production, 2011/



Source: AGROinform

Since competition in the Moldovan tomato market is high it is not common to have significant margins at each level of the value chain. On average price margins vary between 0.5 and 1 MDL/kg at each level and this usually is sufficient for each of the actors to cover their costs and generate profit. A mini-bus trader would usually receive a margin of 0.5-1.0 MDL/kg minimum in high season. At the end of the season, starting from beginning of October until the Turkish tomatoes arrive, trader margins may go up to 1.5-2.0 MDL/kg. Average in-season price margins for local value chain actors for fresh greenhouse and open field tomatoes are presented in the tables below. The percentage margin of each cost is deducted from the final price the Consumer is paying.

The analysis per kilo of greenhouse growers shows that growers get the highest margin, retailers the second highest margin and traders the third. Margin distribution is similar for open field tomatoes however the grower margin is lower.

The price of the tomato seed is formed as following: X (price in Holland or Germany) + 5-15% (transportation cost) + 20% (VAT at the customs) + 0.8% (customs procedures) + 20-40% (profit margin of the seed trader).

Table 8. Case Study for Value Added Price Ladder for Greenhouse tomatoes (sales price 5 lei/kg at farmergate)

Functions	Local greenhouse		
	Sum of costs MDL	% of final price	Costs & Margins
GH structure installation		2.62	0.18

Grower costs	Soil Prep &Fertilization	0.18	7.89	0.55
	Seedlings	0.73	22.1	1.53
	Inputs (mulch, wires)	2.26	2.86	0.20
	Plant care	2.46	6.64	0.46
	Fertigation	2.92	1.51	0.11
	Harvesting	3.02	4.51	0.31
	Pulling off plants	3.34	0.5	0.03
	Taxes	3.37	1.28	0.09
Grower margin	Farmergate Sale price 5 lei	3.46	22.2	1.54
Trader costs	Transport	5.00	2.88	0.20
	Access to sale point fee	5.20	0.36	0.03
Trader margin at truck market		5.23	7.21	0.50
Retailers costs & margin		5.73	10.1	0.70
Consumer costs	Left, tax of 8% on right	6.43	7.41	0.51
Consumer price with VAT 8%		6.94	100.0	6.94

% is of total sale price to consumer (6.94 lei)

In the table above costs are seen in red and margins in green. This table tells us the breakdown of costs and margins at each step of the value chain. As can be seen in the table above, greenhouse growers make a healthy profit margin (more than 44% of costs on the farm level).

Table 9. Case Study Open field tomatoes (sales price 2.5 lei/kg at farmergate)

Functions		Local / field		
		Sum of cost MDL	% of final price	Costs & Margins
Grower costs	Preparing soil	0.00	4.06	0.21
	Inputs	0.21	11.60	0.60
	Nursing the crop	0.81	6.38	0.33
	Taxes/contingencies	1.14	3.29	0.17
Grower margin		1.31	25.80	1.20
Trader costs	Transport	2.51	3.48	0.18
	Spending /per diem	2.69	0.39	0.02
Trader margin at truck market		2.71	8.65	0.40
Retailers costs & margin		3.11	25.78	1.20
(VAT shown as cost 8% .34)				
Consumer costs		4.31	7.41	0.34
Consumer price with VAT 8%		4.65	100.0	4.65

% of final cost to consumer 4.65

The table above shows that for open field, the profit margin is less than for greenhouse growers. The margins at the wholesale and retail level are the same.

Key variations in margins are determined by the price that traders are able to negotiate with producers, usually at the farm gates or at the wholesale markets. Because producers depend on traders for market access, their bargaining power is limited and farmers often sell their produce below the average market price to get rid of the product and reduce the risk of not being able to sell all of the produce. As a result, growers often get lower profit margins. Growers of field tomatoes also have an option of selling to processing companies (with price being the same as what traders would pay for open field tomatoes - 2.5 MDL/kg). As a rule, farmers prefer to sell to whoever offers the best price

on the spot and frequently choose to sell below the market price in order to get cash in hand immediately.

Vertical linkages

Farmers either sell their produce at the farm gate to mini-bus traders or distributors, or choose to take their product to either the wholesale or retail market and trade directly. (In case of direct trade on the market, a farmer would incur an open retail market fee of 80MDL/day). Long-term working relationships between farmers and intermediaries are not common, and transactions are completely market based with competition based on price. Producer bargaining power vis-a-vis traders is limited by the number of traders in the market. This makes competition in the market quite volatile and unpredictable. Often growers representing themselves in an open air market, having to farm still, would dump the prices at the day's end in order just to leave since other business is waiting for them in their greenhouse. The next day it is quite difficult for them to raise back up the prices because the customers have already perceived a lower price and would expect it to be low when they will buy the next time.

Transactions between growers and traders are sporadic with a low cost of switching from producer to producer. Producers get the same price for their tomatoes regardless of which retail outlet the produce is ultimately sold at or whether it is sold for processing. Due to high risks, producers frequently sell their produce below the market price that way also reducing the market price for other farmers. With limited financial analysis skills growers frequently do not understand the impact of the loss on their overall profitability and do not see the value in marketing cooperation.

Transfer of market information and requirements to growers is also limited by their lack of direct contact with the retail market. When farmers trade directly to retail, most of their produce is sold in the open air markets where quality requirements are low and transactions are informal, so there is no incentive for them to perform well on quality. For the purposes of selling to supermarkets the growers are trying to increase their quality, but it is still insufficient, since the businesses they are running are small and supermarkets need larger volumes. At the same time, lack of capacity to supply consistent volumes of produce, poor quality and lack of SPS certifications limit producer access to distributors and traders who supply to higher value retail channels, such as supermarkets, and are interested in developing longer term relationships with growers to ensure consistency of supply. Some processors interviewed for this study also seek to establish contract relationships with growers to ensure consistent supply, but due to poor production practices are unable to source the necessary volumes of raw material. In addition, due to lack of long-term strategic planning, farmers frequently side-sell and do not fulfill contracts if they see an immediate cash opportunity, often at a long-term loss for themselves. Frequently processors provide the required amount of inputs (seeds and fertilizer) to ensure the needed volume of supply, but due to poor production practices (such as lack of irrigation, appropriate fertilization, pest management, etc.) farmers are unable to get the yields expected by the processors.

To increase the flow of learning and benefits to growers, uncertainty and risks for both growers and traders need to be reduced by making the vertical relationships within the value chain more balanced and interdependent. For example, permanent working relationships between growers and intermediaries would result in lower overall price fluctuation for the growers and reduced risks. Opportunities exist to increase supply to supermarkets, as a channel with a long-term growth trajectory, through establishing seasonal contracts with distributors who supply supermarkets. Such arrangements would reduce the frequency of negotiation for growers, limiting market uncertainty and would ensure a price and a market outlet for a share or all of the harvest. Farmers would limit their exposure to price fluctuations of the open market, reduce costs of transporting produce to market, and increase their bargaining power overall. In addition, in the long-term this will increase the flow of market information to farmers and will create incentives for improved quality.

In addition to building relationships with distributors supplying supermarkets, the production season also needs to be extended to ensure the needed volumes of supply for a longer period. According to distributors interviewed for this study if local producers could ensure volumes and quality of supply to supermarkets through early December they would not sign contracts with Turkish importers for that month. Currently farmers expect payment on the spot and do not understand the profitability of such business models working with supermarkets (including invoices, paper trails and sometimes post payment), especially as growers don't typically have developed cash flows or bank accounts. Farmers prefer cash believing that they don't owe anything to the government, which is making their life more difficult than it already is.

Horizontal linkages

Horizontal farmer collaboration is currently limited by lack of a commercial mentality of growers, lack of grower cooperation and investment. Joint marketing and other horizontal collaboration among tomato growers is weak due to lack of overall awareness about the benefits and market opportunities such cooperation could bring. Generally, farmers do not trust any form of formal association or cooperative for marketing their products, and as a result the interests of vegetable producers at large are also not represented. A short term mentality results in low incentives to change and accept the requirements of new business models, such as post payment terms, which contradict the current practices of getting cash payment on the spot.

Some positive examples of collaboration exist, however, such as the new marketing cooperative created by vegetable producers from Dubasarii Vechi village, OgutaProd COOP, and the Vegetalcom Coop in Balauresti village. OgutaProd COOP was created by 10 vegetable producers from Dubasarii Vechi village and offers some of services to its members such as training seminars, joint procurement of fertilizers and pesticides, production of seedlings, and joint product marketing.

2.4 Supporting Services and Institutions

Input supply service providers

Seed suppliers: In Moldova, tomato seeds are imported (from France, Holland, Italy, and the Czech Republic) or obtained locally through a few local seed dealers: Agrofite-Bonus LLC, Vadalex-Agro LLC, Irrigata CropService LLC, Fructul LLC, Agrodor-Succes LLC, Irrigata Crops Service LLC and Vadalex Agro LLC. Input suppliers are also providing technical assistance to client farmers through their consultants in the field and demonstration plots serving as training sites and testing sites for new varieties. Seed suppliers, provide introductory trainings for their customers and suggested plant protection plans (such as application of fertilizers and pesticides). The only local seed producer in Moldova is the Institute of Seed Selection in Tiraspol that specializes in open area seed production. Testing and registration of new varieties on the local seed market is limited by cumbersome regulatory procedures which is using the old-soviet algorithm and actually is limiting the competitiveness of local producers. Basically it is protecting the national food security but in reality the respective food security pertains only to the wheat varieties and has nothing to do with vegetable production.

Some tomato producers are buying seeds from un-official suppliers from Russia, Ukraine, Romania and EU and import them unofficially, at the bottom of travel bags, in pockets. There are some examples when farmers are producing their own seeds for their own use and for selling in small quantities to other farmers in the area. For example, a tomato producer from Dubasarii Vechi village is getting the parent stock from Russia and producing tomatoes of Soyuz 8 F1⁹ variety for the Russian market. Most local varieties however, are not appropriate for commercial greenhouse production though they are still used by some of open field producers at a very low extent. Some farmers are still buying seeds from Tiraspol Institute of Plant Selection through institute's specialized stores or from the institute's former researchers, who have started their own commercial seed production operations.

Seedlings Producers: The largest seedling producers in Moldova are Ecoplantera LLC (Chisinau) and Fructul LLC (Truseni village). These companies are using advanced technologies and equipment for seedling production and are signing delivery contracts with farmers well in advance of the growing period. These companies are using their own seeds for seedling production. In addition, both of the companies are also offering other input supply services, such as greenhouses, irrigation, and heating equipment. Sometimes Ecoplantera organizes field days at their production site, demonstrating new greenhouse equipment. Fructul LLC is less open to disseminating information to the farmers, but is used by Academy of Science for research on the alternative energy use for greenhouse heating. Small-scale seedling producers also operate in the main production areas. They produce seedlings for their own use and are selling the surplus to other farmers in the village. In addition, about 83% of tomato farmers are producing their own seedlings.

Fertilizers and Chemicals Dealers: There are 17 licensed companies - distributors of fertilizers and chemicals -- in Moldova: Fertilitate JSC, Fructul LLC, Vadalex – Agro LLC, Bioprotect LLC, Agrostoc COOP, and others. All fertilizers are imported. In 2009 the value of imported fertilizers was \$13,080,579, most of the import coming from Russia (\$8,557,598) and Ukraine (\$1,691,354). Moldova imports approximately 70,000 to 80,000 tons of fertilizer each year. According to major fertilizer distributors, the real production need is at least 150,000 tons per year. In addition to cost, many small producers, less commercially oriented, don't see the value in fertilizer use because they have great faith in Moldovan soil. In addition, there is lack of information on the proper application and storage of fertilizers among producers. A few producers are performing soil testing before the production season and applying the fertilizers without any fertilization plan.

⁹ Determinant variety, ripening period 102...117 days, yield 5...12 kg/m², the weight of the fruit – 70...100 gr.

Packaging suppliers: There are 11 packaging manufacturing companies in Moldova (Annex C). However the packaging material is often imported and the customs tariffs on imported packaging materials are high (ranging from 11 to 15% for carton packaging and 10% for glass containers and lids).

Agricultural Equipment Suppliers: There are 13 agricultural equipment suppliers that offer their services to the sector (Annex D). One of the main suppliers of greenhouse structures is AgroseraPrim LLC. They offer demonstration trainings in the regions. They also have a website with information about different kinds of greenhouse structures and other greenhouse equipment such as irrigation systems, heating, and ventilation equipment. Agrodor-Succes LLC is mainly focused on irrigation systems supply. Recently they also started to supply greenhouse structures.

The main supplier of the plastic greenhouse covers is SANIN LLC which also provides technical assistance, including demo plots to farmers related to different types of greenhouse covers and set-up. Almost all the equipment suppliers are providing introductory trainings on using their equipment to their customers. Only one manufacturing company – Moldagroteh from Balti manufactures the greenhouses structures and biomass burners. Currently, the company is manufacturing the equipment by order only and they do not keep stocks of such equipment.

Other service providers

Extension services and training: These services are available to producers from several providers which provide market information and production training to the entire vegetable production sector.

- **ACSA** is contracted by the Ministry of Food and Agriculture and World Bank to provide extension services through their local and regional consultants. The main extension agents are active in the vegetable production clusters. ACSA manages a website www.acsa.md where a market information system is incorporated and farmers can place their offers and purchasing requests. If there is no internet connection (for example in small villages), it's also possible to place an offer or source produce via regional extension agents.
- **AGROinform** is a business service provider that operates in the regions and provides technical assistance and consultancy in vegetable production and the formation of cooperatives and marketing groups. AGROinform runs a web site www.agravista.md where farmers can access price information and also place their sale offers and link to buyers.
- **State Agricultural University of Moldova (Department of Horticulture)** used to be one of the main providers of information and technical support for vegetable producers. At the moment, however, the most experienced horticulture specialists have left the Department.

Research institutions: Technical and Research Assistance for Vegetable Production in general includes:

- Research Institute for Soil Science and, Agricultural Chemistry “Nicolae Dimo”
- Research Institute for Field Crops of the and Production Association “Selectia”
- Research Institute for Corn and Sorghum of the and Production Association “Porumbeni”
- Institute for Research and Technological Design in Food Industry
- Research Institute for Plant Protection

These research institutions are running research programs financed by the state. Sometimes these programs involve research on the farm level. In this case there are some sporadic training events organized by the research institutions. As usual practice, consultants from these institutions are contracted individually by service providers such as ACSA, and AGROinform to deliver training programs for farmers.

Regulatory institutions

Quality assurance institutions and laboratories: The structure of institutional support for the high-value agriculture sector in Moldova is developing, albeit slowly. Institutions for Monitoring the Quality and Safety of Food Products in Moldova include:

- Standardization and Metrology Service of the Republic of Moldova (Chisinau, Balti, Cahul)
- Center for Standardization and Testing the Quality of Canned Products
- National and Practical Center for Preventive Medicine

The Ministry of Agriculture and Food Industry has a legislative and regulatory role in the agriculture sector. The Department of Marketing Policy and Vegetable Production is a linkage point between the Ministry and vegetable producers.

The National Farm Federation (FNFM) is mostly lobbying for vegetable growers' interests and is less focused on providing technical support for them.

Limited or missing services

Post-harvest handling facilities: As can be seen from the value chain map, the function of the post-harvest handling in the tomato value chain is missing. No warehousing and pre-cooling/cold storage facilities or services are provided along the value chain.

Soil testing facilities: There is a shortage of soil testing facilities in Moldova. There are some soil testing facilities, located in the districts, but most of them are in and around Chisinau, not in the farming areas where they would more likely be used. As a rule, farmers are not performing soil testing. Lack of information about the components of the soil is leading to the unbalanced fertilization program and as result to poor quality of fresh tomatoes. Available soil testing is considered expensive by farmers - the cost of one soil test is 260 MDL and includes Nitrogen, Phosphorus, Potassium (NPK), humus, and pH tests. Additionally, for each of the microelement there is an additional cost of 60 MDL/microelement.

Specialized consultants with hands-on experience are in limited supply. There are some production clusters, e.g. Taxobeni village, where tomato growers do not have access to specialized trainings and input suppliers are not reaching this territory. As a result, tomato growers in these areas do not use drip irrigation, enhanced quality plastic greenhouse covers, and high quality seed varieties.

Financial services: According to the Census report of 2008, 90% of the vegetable producers are using their own finances for new greenhouse construction, 11% are using grants/subsides, and 9% get bank credit. The low number of loans issued to vegetable growers by banks is explained by high interest rates for producers and high risk of non-repayment for the banks. The state runs a subsidy program for the HVA sector annually, including for the greenhouse sector, under which vegetable growers will be reimbursed 40% of the investment in greenhouse infrastructure, equipment, greenhouse covers, spunbond and 30% of the investment made in procurement of seedling material (grown in palettes). The program is difficult for farmers to take advantage of since many tomato growers are not using invoiced transactions.

3. Productivity Analysis

3.1 Production Cost Benchmarking and Analysis

Moldova's key competitor, especially in the domestic market, is Turkey. In Turkey the total area of tomato cultivation covers 183,703 hectares and production has reached 10 million tons with the average yield of 54 tons/ha, which in Moldova the area of tomatoes production is 6,000 ha and officially reported average yield is 9.5 tons/ha¹⁰. In Turkey 20 % of production is carried out under greenhouse conditions, while in Moldova the area of greenhouse production constitutes 9% of the total production area¹¹. As seen in our productivity section above, Moldovan producers can compete in productivity in greenhouse yields, however have significantly lower productivity in the case of open field production.

The table below presents a detailed calculation of greenhouse production cost components based on a case study (Puhaceni village) in Moldova. Production cost per kg of tomatoes is 3.5 MDL/kg¹² (\$0.3/kg). Financial analysis shows profit margin of 44.5% (in case of sales price 5 MDL/kg at farm gate). Cost estimates in the table below are based on field interviews by ACED team and include the following assumptions:

- Prices of inputs are based on 2011 production season.
- Seedlings are produced by the grower. For the first production cycle the cost of the seedling is 5.0 MDL/seedling (\$ 0.43/seedling), and for second cycle is 3.5 MDL/seedling (\$ 0.43/seedling).
- Greenhouse is not heated.
- Film can be used for 4 years and mulch for 3 years.
- Water is from the grower's well and is not included in the total cost, only the electrical energy cost for pumping the water is considered.
- Cost components include two production cycles.
- Total volume produced was 7500 kg of fresh tomatoes in I cycle and 4000 kg in II cycle.
- The sale price was 5 MDL per kilo at the farm gate for both of cycles.

¹⁰ G. Keshkin, et. al., An Analysis of Tomato Production Cost and Labor Force Productivity in Turkey, 2010 (published in the Bulgarian Journal of Agriculture Science, 16 (No 6) p692-699.

¹¹ Moldovan National Statistics Department, www.statistics.md, 2010.

¹² All the calculations are presented as rate 1\$ = 11.5 MDL

Cost component	Moldova ¹⁵	Turkey ¹⁶
Share of labor costs in total production costs, %	21,31%	5,65%
Labor cost, \$/kg	0,06	0,02
Labor cost, \$/ha	14,748	2,439
Total production cost, \$/ha	69,219	43,051
Yield, kg/ha	200,000	170,000
Unit selling price (farm-gate), \$/kg	0,43	0,36
Unit cost, \$/kg	0,30	0,25

Unit cost of greenhouse produced tomatoes ranges from \$0.09 to 0.25¹⁷ per kg in Turkey¹⁸ and is \$0.30 per kg in Moldova. An important cost factor difference between Moldova and Turkey is the share of production costs spent on labor (21.31% in Moldova vs. 5.65% in Turkey). It is estimated that the labor cost in Moldova for the 2 cycle greenhouse tomato production accounts for 21% from the total production cost, and includes soil preparation, fertilization, and harvesting (with harvesting accounting for 8% of labor costs). In order to increase productivity per worker Greenhouses need to develop labor skills, re-engineer greenhouse designs for more convenient harvesting, and develop labor motivation schemes to retain the same workers year on year.

In addition to labor expenditures as a share of total production cost, a significant share of production cost in Moldova is spent on seedlings (44%) and soil preparation & fertilization (15%).

Minimizing overall production costs by increasing the labor force productivity and increasing yields (by using the biological potential of the hybrids with proper fertilization, introducing soil testing, fertigation, enhancing greenhouse design and ventilation, etc.) would increase productivity of the value chain compared to competitors.

1. **High labor expenditure** is a result of low labor productivity. For example, as shown in the table above, Moldovan producers spend 4 times more on labor costs to produce 1kg of tomatoes, even when the daily cost of labor in two countries is comparable. In Turkey (Antalya region) the cost of farm labor is \$ 8 per day and in Moldova it is \$ 6-8.7 per day. In an interview with ACED team, a large greenhouse grower pointed out that in Hungary a 4.5 ha greenhouse facility employs 16 workers, while at his 2 ha greenhouse facility he employs 20 people, all directly involved in the production process. Low labor productivity is a result of several factors. These include: lack of skills and adequate training of farm laborers; lack of continuity in relationships between growers and temporary seasonal workers where workers do not go back to the same farm season to season; low incentives for better performance and quality of work; and poor design of greenhouses, such as too narrow construction of greenhouses which results in lower work productivity per row.

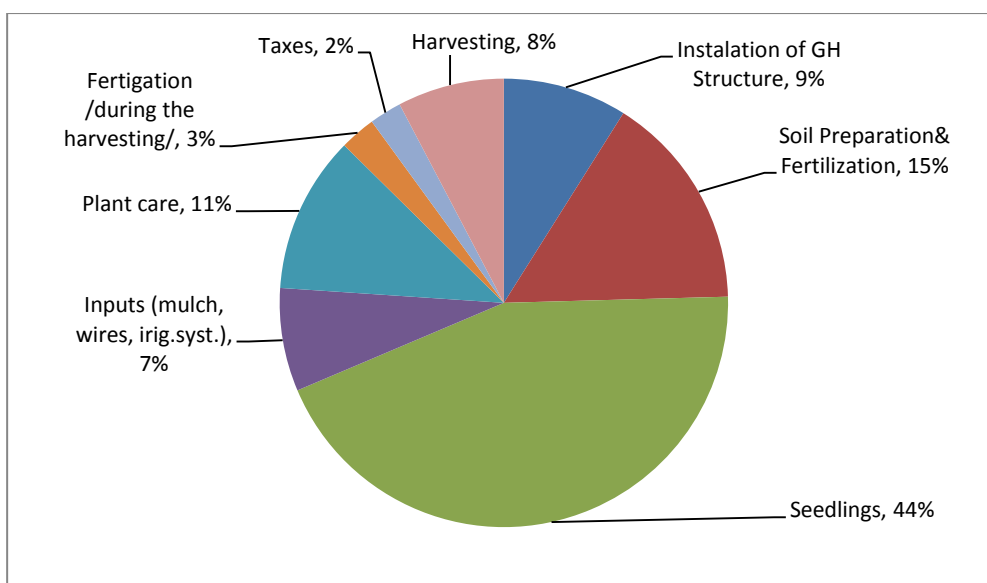
Figure 10. Cost structure for tomatoes greenhouse production, with labor

¹⁵ Based on ACED team analysis

¹⁶ Same source as footnote 13, authors calculations

¹⁷ \$1=1,79 YTL

¹⁸ G. Keskin, F.F. An Analysis of tomatoes production cost and labor force [productivity in Turkey, Bulgarian Journal of Agricultural Sciences, 2010



Source: ACED Team estimation

2. **The high cost of seeds and seedlings** is the principal cost driver for greenhouse tomato production. This category of costs accounts for 41% - 50% of production costs depending on the variety of seeds. Because tomato seeds are imported about 35 % of the cost is the cost of import and about 20-40% are margins of the local distributor. Seed distribution companies do not have fixed prices for the same varieties of seeds. The price depends on the quantity purchased by the grower. Compared to the labeled retail price, distributors usually offer a 5-25% discount to groups of farmers purchasing 0.5 – 1.0 kg of seeds depending on many factors – variety, oversupply, new regional promotion, etc.
3. **Soil preparation and fertilization** is the third largest cost component, accounting for 15% of production costs. The high cost is due to the fact that mineral fertilizers are imported. In addition, farmers do not follow proper procedures for the use of fertilizers as they do not perform soil testing, which would allow them to develop a more balanced fertilizer program. Other factors include cost, and a lack of knowledge of the benefits to be realized from properly utilizing correct amounts. Farmers can either apply more fertilizers than needed or less fertilizers in inefficient quantities. The fertilizers are applied mostly in soil and farmers are not using fertigation – application of fertilizer in the irrigation water. In case of fertigation, the assimilation of the fertilizers by plants is more efficient and the quantity of applied fertilizers could be reduced.
4. **The high cost of energy** results in high costs of greenhouse heating, which is considered to be a major problem by 85% of the vegetables growers in protected area. Energy costs constitute 60 - 80% of the total production cost of greenhouse vegetables for those that use heating.¹⁹ As a result, 43% of tomato greenhouses are not heated at all, and the rest of the tomato growers heat greenhouses mainly for temporary crop protection against late spring frost. Currently, only one exceptional company (Verde Mondial LLC) is using heating to extend the season. Greenhouse growers are using different sources of energy, but wood is the predominant one – 38.5%. Opportunities to reduce heating costs include the use of double layer films for covering the greenhouse, which can reduce the heating costs by over 25%²⁰,

¹⁹ Using of alternative sources of energy for greenhouse vegetable production. Compendium of the Second National Forum of the Cluster “Producing Vegetables in Protected Spaces” March, 29, 2007

²⁰ Greenhouse sector in Moldova. Report prepared by David Adams, July 2011

and using thermal screens, covering the north walls on the inside with aluminum foil to reflect light back onto the crop, and use of alternative energy sources.

5. Packaging is mainly used for transporting product to market and currently is not a significant cost component for growers as they use reusable carton boxes. However, the poor quality carton boxes used by the producers frequently lose their firmness and collapse as a result of condensation when tomatoes are transported in lorry trucks without refrigeration (furthermore, condensation from refrigerated trucks would only increase this phenomenon). Better packaging is used by distributors and exporters who carry the cost of 1MDL/kg for styrofoam and plastic crates and 0.8 MDL/kg for wooden crates (Table 11). The following types of packaging are available and used in Moldova:

- Wooden crates - mostly used by exporters for transportation to Belarus and Russia. Weight of such boxes with the product is 10 kg (crate weight – 1.1 kg)
- Carton boxes – used for local transportation of the product on the local market. Weight of such boxes with the product is 22 kg (box weight - 1.5 kg)
- Plastic crates – used for local transportation of the product by minibuses on the local markets. Weight of such boxes with the product is 8 kg (crate box weight – 0.4 kg)
- Styrofoam/plastic crates – used for packaging the product by distributors and supermarkets and is the most advanced type of packaging currently available.

Table 12. Average cost of different packaging produced in Moldova

Type of package	Tomatoes (8 kg Euro standard crate)		
	<i>Average Price/crate</i>	<i>Loadings/truck</i>	<i>Cost per kg</i>
Corrugated Fiberboard	0.44	3900	0.088
Wooden crates	0.48	2300	0.06
Plastic crates	0.75	2500	0.093

Source: MIEPO

3.2 Constraints to Increasing Production

In addition to high production costs, a number of production level constraints hinder the productivity of the tomato value chain in Moldova. Extending the production season to compete with imports will require increased yields in the off-season and increasing productivity. As ACED helps increase exports, it will be possible to explore additional add-on export deals in the tomato sector as quality increases. Following is an analysis of key production constraints and opportunities for improvement in greenhouse production.

- **Lack of post-harvest facilities** (pre-cooling, cold storage, calibration) results in post-harvest losses of 10-15% by volume.²¹
- **Poor design of greenhouses** (lack of heating, poor ventilation and poor insulation) limits extension of the production season and reduces potential yields. Greenhouse heating systems are seldom used by farmers (beyond the occasional use to combat frost) due to high costs of heating. Using double layers of plastic film would cut the heating costs by 25% compared with the single layer plastic cover, but would also make it possible to start the season 15-20 days earlier allowing growers to get the product to market earlier in the spring and later in the fall when the prices are higher. Currently, about 88% of tomatoes are grown in plastic greenhouses with one layer of film, 24% in plastic greenhouses with double film and about 1% in glass greenhouses. Improving greenhouse ventilation would also help keep plants cooler during the hot time of the production season and reduce the percentage of aborted flowers (lost yield).
- **Improving performance of planted varieties** is needed to reach the full performance potential of planted varieties. Farmers are unfamiliar with the varieties they plant and how they perform and sometimes fail to achieve the full production potential of the variety. All of the varieties produced by tomato growers are underperforming. Based on the interviews with farmers the average estimated yield per hectare could reach 150 - 200 tons. However, as shown in the table below, the performance potential of the varieties is higher.

Table 13. Characteristics of some tomatoes seeds varieties planted in Moldova

Producer	Hybrids / Local dealer	Cost per seed, lei/seeds	Production potential in protected area, kg/m ²
	Agrofit-Bonus LLC		
Clause	Cristal F1	0,28	30...35
Bejo	Tolstoi F1	0,25	27...30
Clause	Fantazio F1 ²²	0,8	30...32
	Vadalex-Agro LLC		
Syngenta	Izmir F1	1,64	32...35
Syngenta	Ivet F1	1,64	15...18
	Irigata-Crop Service LLC		
Rijk Zwaan	Abellus F1	1,7	30
Rijk Zwaan	Lilos F1	1,7	28...30
Rijk Zwaan	Beril F1	1,7	30...32

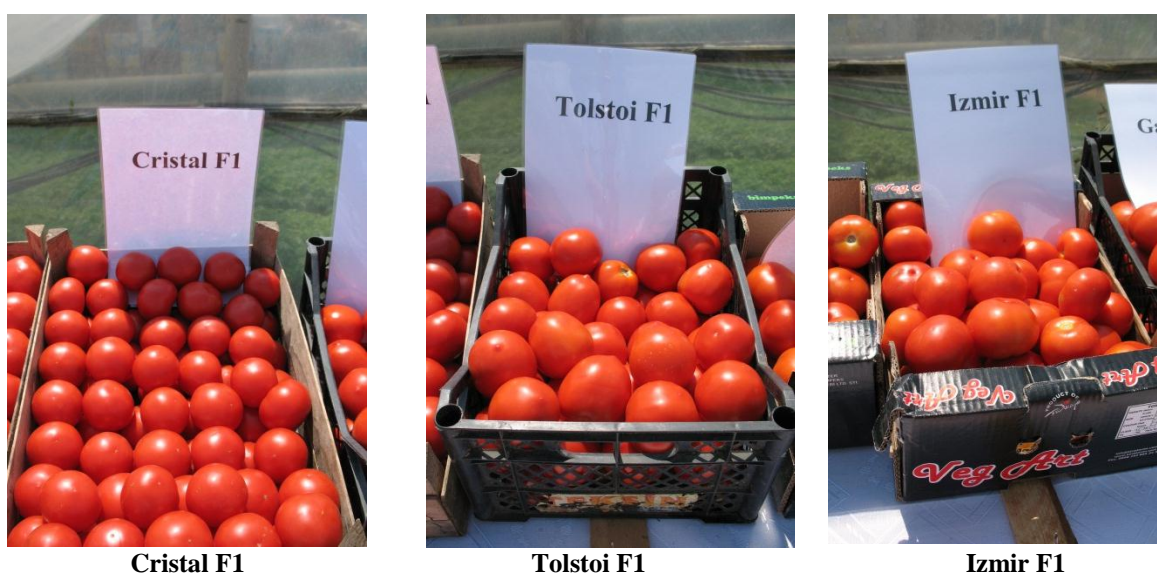
Source: Information provided by seed dealers Agrofit-Bonus LLC, Vadalex-Agro LLC, Irigata-Crop Service LLC

²¹ Greenhouse Sector Action Plan for Azerbaijan, USAID, May 2009

²² Fantazio F1 is not yet included in the State Register of Plants Varieties 2011, but farmers are producing it since 2009.

Some of the varieties of tomatoes that are planted in Moldova include: Cristal F1, Tolstoi F1, Fantazio F1, Izmir F1, Ivet F1, Abellus F1, Lilos F1, Beril F1 and widely used for protected area. The survey conducted by ACED training team, has shown that the most preferred hybrids of tomatoes produced at the moment by farmers are in descending order: Tolstoy F1, Lilos F1, Cristal F1. In the future, producers would prefer to plant Tolstoy F1, Magnus F1 and Abelius F1. If the producers want to reach new or specific markets, they will need to take this into account when choosing varieties. For example, Cristal F1 is preferred by local consumers but has poor shelf life and transportability and therefore would not fare well in export markets. Another consideration that should be taken into account at production planning is considering a harvesting schedule so that not all tomatoes ripen at exactly the same time.

Figure 11. Some of the varieties of tomatoes that are planted in Moldova



The main reasons of underperformance of planted varieties in greenhouses are the following:

- Poor quality of water used for irrigation (high salinity).
- High level of soil pH (in Moldova the pH is alkaline – higher than 7). For tomatoes the optimal level of pH = 6.7.
- Rare soil testing and poor fertilization (lack of macro- and microelements in the soil).
- Those famers who are using organic fertilizers and preparing the compost to be applied during the inter-cycle period sometimes use poor quality compost that is a source of infection for soil and plants.
- Limited use and improper application of fertilizers. Lack of use of water-soluble fertilizers.
- Not ensuring the right temperature of soil at the beginning of the production period which leads to shortening the production period.
- Poor ventilation of the greenhouse leads to excessively high temperatures during July- August which causes poor flowering and decreased yields.
- Fluctuation in temperature levels between night and day temperatures at the beginning of the production season (early spring) and at the end of the production season (late fall) lead to infection of plants.
- Limited use of pollination and ripening stimulators.

For open field tomatoes, the following opportunities for production improvement exist:

- Improved irrigation that would more than double the yields.

- Intensive production technologies using mesh wiring and poles.
- Use of planting machines.
- Better fertilization use and pesticide application.
- Better variety selection. Variety selection for open field will be better attuned to the needs of processing companies.
- Introducing irrigation use.

4. Systemic Constraints Within the Value Chain

Chapter II of this report includes a detailed analysis and prioritization of value chain constraints as they pertain to its ability to meet end-market requirements. Overall, several systemic issues limit value chain competitiveness and access to higher value and more profitable markets. These are:

Inability for meet market requirements for quality

- Limited shelf life as a result of lack of post-harvesting capacities (pre-cooling, cold storage, refrigerated transport). Planting the right varieties (for example, varieties with more firmness) would also extend the product shelf life.
- Poor visual uniformity of product (tomatoes of different sizes are mixed together) as result of lack of grading lines and calibration. Basic sorting and grading are done manually – if at all.
- High incidence of visible defects due to unbalanced fertilization and pesticide use which results in poor quality of fresh tomatoes (green middle, cracked).
- Poor compliance with SPS standards as a result of improper use (doses, timing, safety) of pesticides, insecticides, fertilizers, and stimulators. Lack of recordkeeping on timing of sprays, so that the after-spray period does not overlap with the market delivery day leaving chemical residuals on the fruit.
- Failure to market cooperatively and recognize market standards among small grower operations leads to disparate quality of fresh tomatoes and lack of uniformity of varieties supplied to end markets.

Inability to supply sufficient volumes and low productivity:

In addition to the production constraints discussed earlier:

- Limited access to finance and lack of affordable credit result in limited investment in technologies that would increase production such as cooling equipment for pre-cooling and cold storage and improvements to greenhouse design.
- Lack of harvest planning results in growers harvesting at the same time and inability to harvest for an extended period of time in order to supply required volumes on a consistent basis. Also, need to plant new varieties that would support longer harvesting seasons.
- Lack of long-term strategic planning limits farmer buy in into trying new business models and cooperative marketing arrangements that would allow for collective access to higher value markets.
- Business enabling environment constraints resulting in high production costs (see table below for a detailed analysis of business enabling environment constraints).

Other constraints include the following environmental and health related concerns:

- Limited use of crop rotation.
- Growers are not following instructions regarding the safe use of pesticides and insecticides and are not using proper methods and facilities for storing the pesticides and insecticides.
- Growers have limited knowledge about effective crop protection.

4.1 Business Enabling Environment Constraints

BEE issue/constraint	What does it mean for the businesses	Root of the problem/what needs to change
HVA in general/all value chains		
Inadequate access to seeds and seedlings	Low productivity, high cost on inputs	<p>Cumbersome procedures for testing and registration of new seed varieties.</p> <p>Need to adopt the European Catalogue for plant varieties</p> <p>The State Commission for Testing of Plant Varieties, under MAFI, supervised by the 13-member State Council for Varieties is responsible for testing and registering procedure. The Commission is acting according to the internal regulation and is focusing on “strategic varieties.” The typical testing period is two (for vegetables) to three years. Sometimes, if the variety is included in the EU register, the testing may be accelerated, to be completed within one year. For fruits and grapes the testing period is four years (from date of plantation) for varieties registered in EU and three years (bearing period) for national varieties The law allows for non-commercial cultivation (on < 5 ha) of varieties during the testing period.</p>
Rising cost of fuel	High cost of doing business for producer and distributors.	<p>This is an impact of local fuel market based on international one. Unfortunately, almost each year diesel price is increasing before agricultural producers starts new agriculture period (autumn and spring)</p>
<p>Moldova imports almost all of the fertilizers and chemicals used in agriculture. According to a fertilizer dealer, the country imports about 80-85 th. tons of fertilizer annually. This, however, is only one-third to one-half of the actual amount needed.</p> <p>The fertilizer and pesticides price is very high.</p>	Low productivity, high cost on inputs	<p>Need to register automatically the phytosanitary products registered in EU and to simplify the registration process of the new phytosanitary products that comes from SIS countries.</p> <p>The introduction of new phytosanitary products (or mixes) is subject to a testing requirement, handled by the Commission for Testing and Homologation. The testing period is one year for fertilizer and two years for pesticides.</p> <p>The registration cost is not so high, but the dealers are not so interesting</p>

		to register some phytosanitary products because of lack of market According to the National Plan for harmonization of legislation for 2011, the Law nr 119 from 2004 “Phytosanitary products” have to be reviewed.
Low quality of seeds and fertilizers offered on the Moldovan market.	Low productivity, Large amount of low quality products on the market.	Need to increase the capacities of seed laboratory testing and to diminish the corruption. Local producers/multipliers sell the best seeds abroad because of good price, and serve the local market only with poorer elements. In the same time, very often, the seed from import are not of the same size and germination, and problem is because of weak laboratory testing
Difficulty meeting International Standards and Norms due to lack of quality standards compliant with global market requirement. A part of current Moldovan national standards are based on the old GOST system and are not closely harmonized with requirements established by the European Union.		Need to reform legal, regulatory, and institutional framework for food safety and phytosanitary standards. Technical regulation “Quality requirements for trade with fruit and vegetables” has been approved on January 2010, but will enter into force on January 1, 2012 With respect to technical regulations and standards, the EU has adopted the „mutual recognition principle“. Goods legally marketed in one member state must be accepted in any other. Furthermore, the EU’s „Global approach“ supports mutual recognition of Conformity Assessment Bodies and their results as part of economic integration agreements. This means that (i) Moldovan standards should be harmonized with European standards and (ii) the recognition of Moldovan conformity certificates by the EU should be ensured. In this case, EU products will be able to freely enter Moldovan market (as the EU standards and conformity assessments will be recognized by Moldova), while Moldovan products produced under the same EU standards and certified as conforming to the EU rules will be able to access the EU market. So far Moldova has implemented about 45 (15 standards in 2010) EU standards out of approximately 200.

		<p>According to the National Plan for harmonization of legislation for 2011, there are about 21 legal acts that are going to be harmonized, including 4 related to HVA</p> <p>It is clear that the complete modernization of Moldova's technical standards, which are often still based on the former Soviet GOS-STANARD norms, will be technically demanding and time-consuming.</p>
Poor laboratory capacity for chemical testing, which includes pesticide residues, heavy metals, and mycotoxins (aflatoxin). The ability to test agricultural products for chemicals, pathogens, pests, weeds and disease is a key component of a phytosanitary control system.	Consumer health and market access issue in higher value markets.	<p>Need to increase the laboratory capacity for products testing and certifications</p> <p>Lack of modern laboratory equipment and lack of staff capacity to perform testing requirements. Often, certificates are issued without any products testing.</p>
Delay of payments for subsidies offered for orchards, table grapes plantations and equipment for green houses, and irrigation systems.	Lack of investments	The main issue is lack of budget. Because of that, the subsidy regulation, developed by MAFI, is enough bureaucratic with a lot of constraints, and in this case difficult for small and medium size agriculture producers to access subsidy. Agency for Paying and Intervention for Agriculture is the institution responsible for implementation of the subsidy regulation and administration of subsidy fund.
There are a total of 8 border inspection points as well as a series of internal inspection and custom points within Moldova. <u>There are no inspection points along the border with Transnistria yet products from this region receive phytosanitary certificates issued by the Government of Moldova for export to EU and other countries.</u>	A part of enterprises developed on the Transnistria territory are registered to the Chamber of registration of the RM. They produce in Transnistria and get phytosanitary certificates in Moldova without any control of the concrete condition of production. Sometimes the certification is nontransparent and very dubious.	It is a political issue with a lot of questions.
World Bank's 2011 "Doing Business" survey,	Documents for export (number): 6	The number of documents needed for HVA export have to be reviewed and reduced – that could influence the time and cost of export.

where Moldova ranked 141 th (135 th in 2008) on the indicator “Trading Across Borders”.	Time for export (days): 32 Cost to export (US\$ per container): 1775	
Logistical problems (accessing suppliers, orienting suppliers to market demand for fruits and vegetables, and weak institutional structure —lack of strong logistical centers and market information dissemination among producers.	This is more an institutional structure problem than a regulatory constraints	The MAFI does not have a strong market information center for producers/procesors and exporters
Annually, ministry of Agriculture and Food Industry creates/updates a list of exporters of fruits and vegetables to Russian Federation.	This list is not totally transparent and doesn’t have clear criteria for eligible exporters that are included in this list.	Criteria for being added to the list of exporters to Russia, issue of quality control.
High cost of the packaging material (often imported). Customs tariffs on imported packaging materials ranging from 11 to 15 percent for carton packages and 10 percent for glass containers and lids.	This is a significant constrain for all HVA products that are packed and exported.	Need to revise the Custom Tariff and reduce tariffs on imported packaging materials and package. Customs duty on imported packaging materials (increased cost, constraints to export),
Agricultural land and forestland may not be sold to foreign individuals and legal entities, nor to resident legal entities with foreign capital. Foreign individuals who became owners of agricultural land and forestland by inheritance may dispose of such land through legal acts coming into force during their lives only to Moldovan citizens.	Constraint to foreign investment.	Need to revise the Land Code
Land and plantation are not accepted as collateral.	Limited access to finance for producers.	Official land and plantation are accepted as collateral, but the risks are too high, that’s why banks are reluctant to accept it as collateral. Currently, banks (Agroindbank, Banca de Economii) declared almost 2000 ha of land and plantation for forced sale.
Issues specific to Tomato Value Chain		
Informality, lack of invoiced transactions to avoid	If farmers want to sell to	It is a food safety issue. If supermarkets have to ensure food safety they

tax payments. There are 3 major taxes they are obliged to pay – Income Tax (which is 0% till end of 2011), Land Tax (%), - depends of quality of soil. Social Insurance Tax (23.5%). At the end of the day it makes up 2 to 4 percent of the total spending in a tomato production depending on the range of the farm. Also producers don't want to incur an extra cost of hiring an accountant.	supermarkets they have to offer certificates and invoices.	have to require quality certificates and agriculture producers have to offer it regardless farm size or legal form. This is an issue of farm cooperation and association – that will diminish the cost of certificates and maintenance of accounting system.
The cost of heating is considered a major problem by 85% of the vegetables growers.	It is not a regulatory issue.	Need to use alternative source of heating and implement energy saving practices.

Chapter 2: Value Chain Strategy and Action Plan

5. Upgrading Needs and Opportunities

Strategy

Upgrading needs of the value chain are determined by market opportunities and overall market positioning strategy of the value chain. The following market opportunities have been identified for Moldovan producers.

- **Domestic market import substitution** focusing on the local supermarkets channel by extending the production season,
- **Building reputation in the export markets** by increasing the quality sold to the wholesale market segment and become a supplier to distributors in export markets supplying supermarkets,
- **Building reliable relationships with domestic processing companies** in order to have diversified channels in case of open field tomatoes production.

Upgrading needs

Upgrading within the value chain should be driven by the requirements of targeted market segments in end markets and focused on addressing systemic constraints within the value chain that prevent the industry from meeting the critical requirements of these markets. The analysis below is focused on critical success factors in each of the targeted market segments (processing, local supermarkets, export markets) improvements required and constraints that need to be addressed.

Table 14. Market requirements and upgrading needs of Tomato VC

Market segment	Critical success factors/market requirements	Improvement needed	Constraints to achieving these improvements
Local Supermarkets	- Long shelf life (at least 1 week) from the delivery time	- Choosing the right hybrid and timing of harvesting - Planting varieties with high firmness - Pre-cooling	- Expensive hybrids - Lack of knowledge about appropriate varieties - Lack of pre-cooling facilities
	- Supplier capacity to offer supply over extended period	- Cultivating hybrids with different ripening periods - Diversifying the cultivars/other vegetables Improved greenhouse heating and insulation practices	- Increase producer awareness that such business model is profitable - Lack of technical background for new varieties - High cost of greenhouse heating
	- Seasonal contract	- More frequent negotiation of prices in different supply periods that can better reflect the current market situation to limit risk	- Price fluctuations on open markets - Low bargaining power of growers
	- Consistent supply	- Need for a central warehouse to enable pre-cooling and very short term storage - Better production planning and harvest schedule	- Comparatively high cost of cooling equipment - Lack of collective support for this business model from the grower community - Limited production planning and harvest scheduling
	- Invoiced transactions	- Better official accounting and record keeping	- Lack of knowledge in bookkeeping - Lack of willingness to pay taxes
	- Ability to access post payment terms	- Growers need to accept the terms where they are not paid in cash on the spot	- Limited cash flow of producers - Lack of financial planning
	- Supermarkets need to deal with a small number of suppliers	- Need to identify a few suppliers with adequate supply capacity or joint marketing efforts of small producers	- Inconsistency of produce in the given period
	- Suppliers need to have Quality Certifications	- Farmers need to obtain certificates for their production - Need to reinforce phyto-sanitary inspections in the open air market	- Lack of information about certification - Additional payment needed for certification - Lack of knowledge about keeping records on fertilizers and pesticides used - Limited local/ regional Phytosanitary inspection and testing capacity

Market segment	Critical success factors/market requirements	Improvement needed	Constraints to achieving these improvements
Processing companies	- Ensured delivery of contracted volumes of tomatoes	<p><i>For growers:</i></p> <ul style="list-style-type: none"> - Intensive production technology using mesh and poles - Development of supply projections <p><i>For processors:</i></p> <ul style="list-style-type: none"> - Identify dependable suppliers providing volumes on the sustained basis - Find out % contracted versus open market - Labor 'gangs' to help in picking season 	<p><i>For growers:</i></p> <ul style="list-style-type: none"> - Lack of Irrigation - High costs of inputs, fertilizers, planting machines - Limited labor pool for the season <p><i>For processors:</i></p> <ul style="list-style-type: none"> - Supplier unwillingness to supply raw material when the open markets have higher prices.
	- Guaranteed quality of supply (tomatoes for juice or stewed tomatoes)	<p><i>For growers:</i></p> <ul style="list-style-type: none"> - Following the technological requirements <p><i>For processors:</i></p> <ul style="list-style-type: none"> - Identify dependable suppliers providing required products needed for different specs. Provide T.A. and supervision/crop monitoring 	<p><i>For growers:</i></p> <ul style="list-style-type: none"> - Lack of specific skills pertaining to a certain tomato variety - Lack of Irrigation, - Limited labor pool <p><i>For processors:</i></p> <ul style="list-style-type: none"> - Lack of open/established relationships with growers who can honor the supply contracts as agreed
	- Reasonable cost for raw supply	<p><i>For growers:</i></p> <ul style="list-style-type: none"> - Understanding the Adequate pricing for raw supply <p><i>For processors:</i></p> <ul style="list-style-type: none"> - Proper cost analysis to determine % contracted versus open market 	<p><i>For growers:</i></p> <ul style="list-style-type: none"> - Lack of economic analysis and unwillingness to understand the benefits of the business model - High production costs <p><i>For processors:</i></p> <ul style="list-style-type: none"> - Unpredictability of the open market of tomatoes

Market segment	Critical success factors/market requirements	Improvement needed	Constraints to achieving these improvements
Export Markets Open air	<ul style="list-style-type: none"> - Extended shelf life of product - Uniformity of product - Grower consolidator in production area 	<ul style="list-style-type: none"> - Use of cold chain-(from pre-cooling to truck delivering product) - Use of appropriate hybrids - Use of calibration machine - Customized packaging 	<ul style="list-style-type: none"> - High investment cost for pre-cooling and packaging - Lack of knowledge about “extended shelf live” varieties - Lack of uniform quality from divided production community - Lack of understanding among farmers about the required quality and quantity
Export Markets Markets	<ul style="list-style-type: none"> - Extended shelf life of product - Availability of right varieties - Packaging - Supplier ability to accept post payment terms - Ability to offer consistent delivery 	<ul style="list-style-type: none"> - Detailed knowledge about supermarket requirements in different end markets - Use of required hybrids - Introduction of new products into the market 	<ul style="list-style-type: none"> - Lack of knowledge about “extended shelf live” varieties - Lack of uniformity of delivered tomatoes - High / unaffordable cost of modern packaging - Attract even more customers to loyally buy Moldovan produce which is tastier and brings incomes to the pockets of the local farmer

6. Action Plan

Table 15. Action Plan for Tomatoes Value Chain

Market Requirements/ Critical Success Factors	Improvements needed	ACED interventions	Timing	Resources
At least one week shelf life of fresh tomatoes delivered consistently for local supermarkets	Greenhouse growers: <ul style="list-style-type: none"> - Choose the right variety and timing of harvesting - Plant varieties with high firmness - Use calcium treatment - Better production planning and harvest schedule - Use soil protection - Facility to enable pre-cooling and very short term storage 	Organize round tables with tomatoes growers in production clusters to present market opportunities and requirements of local supermarkets.	Nov, 2011	ACED staff; Local specialists
		Organize round tables with tomatoes growers, researchers & consultants to validate suggested innovations in tomatoes production.	Mar, 2012	ACED staff; Local specialists Partner Business (growers)
		Develop and deliver trainings on ensuring longer shelf life of tomatoes such as calcium treatment, variety selection, tomato seedling production and soil protection	Jan, April, May, August 2012	ACED staff; Local specialists Subcontractor
		Publish articles on forced-air cooling, calcium treatment in the Vegetable Value Chain newsletter	July, Sept, 2012	Local specialists
		Develop and deliver a training regarding the benefits of forced-air cooling	May, 2012	Local specialists
		Set up a demo site on forced-air cooling/cold storage facility in tomato production cluster	Jun, Jul, 2012	ACED Staff Subcontractor Partner Business (Growers)
		Develop and deliver a training on proper tomato handling for supermarket personnel	Jun, 2012	International STTA Partner Business (supermarkets)

Ability to harvest for an extended period of time (to meet supply demands of supermarkets and compete with imports)	<ul style="list-style-type: none"> - Improved greenhouse heating and insulation practices - Greenhouse growers develop a proper mix of vegetables 	Develop and deliver trainings on pollination of tomatoes, planning crop harvesting, energy conservation techniques, use of alternative sources of energy, greenhouse ventilation, cover films and waste management.	Jan, 2012 Apr, 2012 Aug, 2012 Ongoing yearly	ACED staff; Local Specialists; Subcontractor
		Organize demo activities on tomatoes varieties, using pollination stimulators, energy conservation techniques, use of alternative sources of energy, greenhouse ventilation, cover films, improved greenhouse design.	Jan – Dec 2012	ACED staff; Local Specialists, Subcontractors
		Publish articles on pollination of varieties, planning crop harvesting, using pollination stimulators, energy conservation techniques, use of alternative sources of energy, greenhouse ventilation, cover films in the Vegetable Value Chain newsletter and distribute it to tomatoes growers.	Jan – Dec 2012	Local specialist Subcontractor
		Develop several models (drawings) of greenhouses appropriate for tomatoes/vegetables production in Moldova.	Dec-Feb, 2011	International STTA, Subcontractor
		Develop and deliver a Training Program on Greenhouse design for local designing companies and equipment suppliers.	Dec-Feb, 2011	International STTA,
		Study tour to Matka village (Romania)–concentrated greenhouse production site.	June, 2012	Subcontractor; Partner Businesses (seed supplier, growers)
Supermarkets use seasonal contracts (invoiced transaction) with a small number of suppliers willing to accept post payment terms	<ul style="list-style-type: none"> - Identify a few suppliers with adequate supply capacity or joint marketing efforts of small producers; - Negotiation of prices on monthly bases to reduce shocks to the market; - Better production planning and 	Discuss with supermarket representatives the quality and delivery requirements for fresh produce.	Dec 2011 Jan 2012 Mar 2012	ACED staff; Partner Businesses (supermarkets)
		Develop in collaboration with supermarkets the delivery calendar of tomatoes/vegetables and discuss it with growers.	Nov 2011,	ACED staff; Partner Businesses (supermarkets)

	<ul style="list-style-type: none"> harvest schedule; - Better official accounting and record keeping; - Growers accept bank account wire payment; 		Jan 2012	
		Discuss with tomato growers marketing plan, contract requirements, present quality specifications and delivery calendar.	Dec 2011 Jan 2012 Mar 2012	ACED staff
		Develop and deliver training on production planning and harvesting calendar.	Jan, 2011	Local Specialist, ACED Staff
		Develop and present business model of a tomato greenhouse operation which is utilizing bookkeeping, Global GAP certification and paying official taxes in order to estimate the costs and risks of doing “official” business	Jan-Feb, 2012	Local Specialist ACED Staff
		Round tables with participation of tomatoes growers from the production clusters to identify informal marketing groups with adequate supply capacity	Nov, Dec, 2011, Jan, 2012	Local STTAs ACED Staff
		Workshops on accounting and bookkeeping for the identified informal marketing groups with adequate supply capacity	Jan, June, Nov, Dec, 2012	Local STTAs
		Facilitate the delivery of tomatoes (and other vegetables) to the supermarket	May-Dec 2012	ACED Staff
High quality (uniform, appropriate size, shape, no visible defects) for higher value added markets (export for high season and local shoulder season)	<ul style="list-style-type: none"> - Use of appropriate hybrids; - Use of calibration; - Customized packaging. 	Deliver training on proper grading, size building techniques and packaging of tomatoes	June, Sep, 2012	Local Specialist; ACED Staff
		Identify and link small producers with packaging producers.	June, 2012	ACED Staff
		Elaborate the business model and plans for a packing and cooling facility in tomato production clusters	Dec, 2012	International STTA, Subcontractor
		Deliver training to local designing companies regarding packing and cooling facility design especially tomatoes	Dec, 2012	International STTA Partners business (equipment suppliers)

		Deliver training on tomatoes/vegetables packing and cooling to growers	Jun, Sept 2012	Local Specialist ACED Staff
		Identify, link growers/investors with direct supplier of pre-cooling equipment	Jan, 2013	ACED Staff
		Provide support in accessing AAF funds and other available financial sources, service providers	Jan, 2013	ACED Staff
		Facilitate investment in a pilot packing and cooling facility in the regional production cluster	Jan, Feb, Mar, Apr, 2013	Local Specialist; Subcontractor; Partners business (growers)
		Deliver the training on maintenance of the facility, Environmental management for packing and cooling facility personnel	Apr, 2013	ACED Staff
Ability to meet Food Safety and Environmental Protection requirements	<ul style="list-style-type: none"> - Farmers need to obtain certificates for their production - Reinforce phyto-sanitary inspections in the open air market - Safe pesticides use and workers protection 	Training on IPM and safe use of chemicals in greenhouse production (including record keeping for applied chemicals) with Global GAP elements	Jan-Apr, 2012	Local Specialist ACED Staff
		Print and distribute Register books to the tomatoes growers	Jan-Apr, 2012	ACED SPS specialist Printing company
		Incorporate in demo activities the component of safe use/storage of chemicals	Jan-Dec, 2012	Local Specialist ACED Staff Partner Business (input suppliers)
		Introduce soil and water testing and development of IPM plans and fertilization programs	Feb, Mar, 2012	Local Specialist ACED Staff Subcontractor
		Include in the newsletter appropriate information material about IPM and safe use of pesticides, insecticides, fertilizers, stimulators and waste management.	Jan-Dec, 2012	Local specialist ACED Staff
		Provide trainings and technical assistance on Global GAP for identified informal marketing groups with adequate supply capacity.	Jan-Dec, 2013	ACED Staff

Sufficient volumes of quality, competitively prices raw material sourced to the factories (for processing)	<i>For open field growers:</i>	Round table (s) with participation of processors and growers (economic efficiency analysis, discussing and identifying win-win contract mechanism, identifying innovations that lead to increased productivity for the supplied crops.	Dec, 2012, Jan, 2013	ACED Staff
	- Intensive production technology using mesh and poles;	Identifying a cluster of growers (in Edinet/Orhei/Ungheni) – potential suppliers of raw vegetables to the processors in these areas.	Dec, 2012 Jan, 2013	ACED Staff
	- Development of supply projections;	Provide technical assistance to improve the contract farming mechanism	Dec, 2012	International STTA
	- Following the technological requirements;	Deliver training in setting up better relations/communication between the growers out-grower managers	Jan, 2013	Partner Business (processors); Subcontractor
	- Understanding the adequate pricing for raw supply.	Deliver training program for a model cluster of growers and other growers in the region	April-July, 2013	International STTA; Local Specialist
	<i>For processors:</i>	Set up demo activities showing different varieties of tomatoes, crop quality management techniques, harvesting techniques, etc	Feb, 2013	Local Specialist, Subcontractor; Partner Business (input suppliers, processors)
	- Dependable suppliers identified providing volumes on a sustained basis	Study tour for a group of local tomatoes growers in Kahovka (Ukraine) – a successful model of contract farming	July, 2013	Local Specialist Subcontractor; Partner Business (Input suppliers, Processors)
	- Proper cost analysis to determine % contracted versus open market			

NOTE: Gender will be considered in some of the planned actions where applicable as follows:

- Both men and women tomatoes growers will be considered for participation in round tables, training sessions, study tours and demo events;
- Both men and women tomatoes growers will be considered in designing demo activities;
- Training timing and venue will be considered when developing the training program to suit both men and women;
- Both men and women will be offered equal opportunities to benefit from technical assistance and support in accessing financial resources;

- Ensure that newsletters, guides, other project-related information reach both men and women;
- Flag women-leaders in tomato value chain as role models to encourage women empowerment in HVA sector.

7. Causal Model

Table 15. Causal Model of Tomatoes Value Chain

Market Requirements/ Critical Success Factors	ACED interventions	Outputs	Outcomes	Impacts
At least one week shelf life of fresh tomatoes delivered consistently for local supermarkets	Organize round tables with tomatoes growers in production clusters to present market opportunities and requirements of local supermarkets.	# round tables organized	Farmers adopt calcium treatment;	Increased incomes for growers selling to supermarkets.
	Organize round tables with tomatoes growers, researchers & consultants to validate suggested innovations in tomatoes production.	# of farmers involved in the round table discussions	Farmers benefit from forced-air cooling/ cold storage facility;	
	Develop and deliver trainings on ensuring longer shelf life of tomatoes such as calcium treatment, variety selection, tomato seedling production and soil protection.	# of farmers reached by distributed newsletters	Supermarket personnel maintain cold chains;	
	Publish articles on forced-air cooling, calcium treatment in the Vegetable Value Chain newsletter	# of farmers trained	Leading to:	
	Develop and deliver a training regarding the benefits of forced-air cooling	# of farmers that visited demo site	Extended shelf life of delivered produce;	
	Set up a demo site on forced-air cooling/cold storage facility in tomato production cluster	# of supermarket personnel trained	Consistent supply of Moldovan tomatoes to supermarkets;	
	Develop and deliver a training on proper tomato handling for supermarket personnel		Leading to:	
			Stable sales contracted	

			<p>with supermarkets;</p> <p>Decreased losses in farmers time marketing;</p> <p>Decreased PHH losses;</p> <p>Increased local sales to supermarkets.</p>	
<p>Ability to harvest for an extended period of time (to meet supply demands of supermarkets and compete with imports)</p>	<p>Develop and deliver trainings on pollination of tomatoes, planning crop harvesting, energy conservation techniques, use of alternative sources of energy, greenhouse ventilation, cover films and waste management.</p>	<p># of farmers trained;</p> <p># of demo activities;</p> <p># of articles published ;</p> <p># of farmers reached by distributed newsletters;</p> <p>three greenhouse models developed;</p> <p># of local specialists in greenhouse design trained;</p> <p># of study tour participants</p>	<p>Farmers adopt crop planning, pollination stimulators and energy conservation techniques;</p> <p>Growers build greenhouses using designed models;</p> <p>Leading to:</p> <p>Harvesting period extended by minimum of 2 months;</p> <p>Growers increase productivity</p>	<p>Increased competitiveness;</p> <p>Decreased imports;</p> <p>Longer term:</p> <p>Increased exports;</p> <p>Increased incomes.</p>
	<p>Organize demo activities on tomatoes varieties, using pollination stimulators, energy conservation techniques, use of alternative sources of energy, greenhouse ventilation, cover films, improved greenhouse design.</p>			
	<p>Publish articles on pollination of varieties, planning crop harvesting, using pollination stimulators, energy conservation techniques, use of alternative sources of energy, greenhouse ventilation, cover films in the Vegetable Value Chain newsletter and distribute it to tomatoes growers.</p>			
	<p>Develop several models (drawings) of greenhouses appropriate for tomatoes/vegetables production in Moldova.</p>			
	<p>Develop and deliver a Training Program on Greenhouse design for local designing companies and equipment</p>			

	suppliers.		Leading to:	
	Study tour to Matka village (Romania)—concentrated greenhouse production site.		Period of deliveries to supermarkets extended;	
	Discuss with supermarket representatives the quality and delivery requirements for fresh produce.		Farmers delivering according to supply calendars	
Supermarkets use seasonal contracts (invoiced transaction) with a small number of suppliers willing to accept post payment terms	Develop in collaboration with supermarkets the delivery calendar of tomatoes/vegetables and discuss it with growers.	set of supermarket requirements on quality, volumes, varieties;	Farmers are acquainted with supermarket requirements;	Increased-taxes paid; Predictable income to growers
	Discuss with tomato growers marketing plan, contract requirements, present quality specifications and delivery calendar.	producer groups identified;	Leading to:	
	Develop and deliver training on production planning and harvesting calendar.	2-3 delivery calendars elaborated;	Farmers use production planning linked to delivery calendars;	
	Develop and present business model of a tomato greenhouse operation which is utilizing bookkeeping, Global GAP certification and paying official taxes in order to estimate the costs and risks of doing “official” business	# of farmers that participated in discussions	Farmers accept post-payment;	
	Round tables with participation of tomatoes growers from the production clusters to identify informal marketing groups with adequate supply capacity	# of farmers trained in production planning & harvesting schedule # of farmers trained on accounting &bookkeeping # of deliveries facilitated	Farmers use simple accounting& bookkeeping;	
	Workshops on accounting and bookkeeping for the identified informal marketing groups with adequate supply		Leading to:	

	capacity		Farmers deliver on a contract basis with invoiced transactions.	
	Facilitate the delivery of tomatoes (and other vegetables) to the supermarket		Stable sales contracted with supermarkets	
	Deliver training on proper grading, size building techniques and packaging of tomatoes			
High quality (uniform, appropriate size, shape, no visible defects) for higher value added markets (export for high season and local shoulder season)	Identify and link small producers with packaging producers.	# of farmers trained on grading and packaging;	Pilot packing and cooling facility set up;	Improved image of Moldovan tomatoes with buyers in export markets;
	Elaborate the business model and plans for a packing and cooling facility in tomato production clusters	# of linkages created;		
	Deliver training to local designing companies regarding packing and cooling facility design especially tomatoes.	design and financial model developed;	Leading to:	Increased exports;
	Deliver training on tomatoes/vegetables packing and cooling to growers.	# of specialist trained;	Secured access to pre-cooling and grading;	
	Identify, link growers/investors with direct supplier of pre-cooling equipment.	# of farmers trained;	Farmers use grading and enhanced packaging;	
	Provide support in accessing AAF funds and other available financial sources, service providers.	key equipment suppliers identified and contacted;		
	Facilitate investment in a pilot packing and cooling facility in the regional production cluster.	# of farmers having accessed the AAF funds;	Leading to:	
	Deliver the training on maintenance of the facility, Environment management for packing and cooling facility personnel.	# of designing companies specialist trained	Other production clusters replicate the investment;	
	Training on IPM and safe use of chemicals in greenhouse		Reliable and consistent quality and volume delivered to local supermarkets;	

	production (including record keeping for applied chemicals) with Global GAP elements.			
Ability to meet Food Safety and Environmental Protection requirements	Print and distribute Register books to the tomatoes growers.	# of farmers trained;	Farmers realize the benefits of Global GAP; Leading to: Farmers use Food Safety/Environmental Protection Practices/Global GAP practices; Leading to: Growers are Global GAP certified; Increased safety of local products; Leading to: Increased sales to local consumers;	Better health of consumers; Increased income.
	Incorporate in demo activities the component of safe use/storage of chemicals.	# of Register books distributed;		
	Introduce soil and water testing and development of IPM plans and fertilization programs.	# of demos sites with; incorporated safe use/storage of chemicals component;		
	Include in the newsletter appropriate information material about IPM and safe use of pesticides, insecticides, fertilizers, stimulators and waste management.	# of farmers that visited such demo sites;		
	Provide trainings and technical assistance on Global GAP for identified informal marketing groups with adequate supply capacity.	# of demo activities with IPM plans; articles published in newsletter;		
	Round table (s) with participation of processors and growers (economic efficiency analysis, discussing and identifying win-win contract mechanism, identifying innovations that lead to increased productivity for the supplied crops.	# of farmers reached by newsletter; # of farmers/groups trained;		

			Increased exports	
Sufficient volumes of quality, competitively prices raw material sourced to the factories (for processing)	Identifying a cluster of growers (in Edinet/Orhei/Ungheni) – potential suppliers of raw vegetables to the processors in these areas.	# of farmers that participated in round tables;	Farmers adopt innovations; Leading to: Farmers obtain increased yields; Processors get sufficient volumes of high quality, reasonably priced raw material; Leading to: More stable relation between out-grower and processor; Diversified marketing channels for growers	Increased export of processed produce; More predictable incomes for out-growers and processors
	Provide technical assistance to improve the contract farming mechanism	# of processors that participated in the round tables;		
	Deliver training in setting up better relations/communication between the growers out-grower managers	# of supply contracts signed;		
	Deliver training program for a model cluster of growers and other growers in the region	# of demo plots set up;		
	Set up demo activities showing different varieties of tomatoes, crop quality management techniques, harvesting techniques, etc	# of farmers trained;		
	Study tour for a group of local tomatoes growers in Kahovka (Ukraine) – a successful model of contract farming	# of farmers that visited demo plots;		
	Organize round tables with tomatoes growers in production clusters to present market opportunities and requirements of local supermarkets.	# of out grower managers trained;		

Annex A. Cumulative Imports of Processed Tomatoes from Moldova, as Reported by Key Markets

Belarus Imports						
World		Moldova		Moldova's share		
	value	kg	value	kg	value	kg
2005	\$8,127,000	13,678,313	\$97,200	149,258	1.2%	1.1%
2006	\$11,201,300	16,365,616	\$60,400	76,023	0.5%	0.5%
2007	\$12,116,000	13,731,890	\$41,200	58,405	0.3%	0.4%
2008	\$20,671,900	16,867,659	\$116,700	84,406	0.6%	0.5%
2009	\$22,041,800	16,151,356	\$71,600	50,380	0.3%	0.3%
2010	\$20,621,400	18,326,512	\$13,000	7,703	0.1%	0.0%

Russia Imports						
World		Moldova		Moldova's share		
	value	kg	value	kg	value	kg
2005	\$285,782,895	532,697,484	\$197,496	455,957	0.1%	0.1%
2006	\$401,303,471	604,960,794	\$32,303	88,992	0.0%	0.0%
2007	\$646,181,391	744,823,586	\$176,721	260,516	0.0%	0.0%
2008	\$762,269,889	869,990,538	\$427,921	847,429	0.1%	0.1%
2009	\$778,899,326	882,718,419	\$644,990	1,130,395	0.1%	0.1%
2010	\$913,151,150	879,122,693	\$596,260	823,317	0.1%	0.1%

Romania Imports						
World		Moldova		Moldova's share		
	value	kg	value	kg	value	kg
2005	\$5,609,742	12,116,502	\$201,731	334,700	3.6%	2.8%
2006	\$7,126,057	14,361,869	\$123,765	208,799	1.7%	1.5%
2007	\$13,890,161	23,250,789	\$242,059	303,673	1.7%	1.3%
2008	\$17,690,140	23,433,721	\$42,266	68,503	0.2%	0.3%
2009	\$22,579,764	29,788,658	\$27,237	38,546	0.1%	0.1%
2010	\$18,799,060	28,703,037	\$44,154	40,830	0.2%	0.1%

Annex B.1. List of Cities Within a Proximity of 2000 km Around Chisinau

Cities in the range	Distance		Cities in the range	Distance	
	bird flight	road		bird flight	road
Romania - Iasi	96	160	Latvia - Riga	1146	1654
Ukraine - Odesa	158	177	Russia - Moscow	1148	1380
Romania – Târgu Mureş	330	587	Czech Republic - Plzen	1183	1623
Romania - Bucharest	357	429	Austria - Salzburg	1192	1575
Romania - Cluj-Napoca	400	610	Poland - Szczecin	1242	1598
Bulgaria - Varna	428	703	Germany - Berlin - Berlin	1271	1584
Bulgaria - Burgas	512	773	Russia - Vladimir	1290	1567
Bulgaria - Sofia	644	819	Russia - Novgorod	1291	1663
Hungary - Budapest	727	1031	Germany - Munich	1301	1681
Poland - Kraków	740	984	Estonia - Tallinn	1410	1947
Belarus - Minsk	768	1081	Russia - Saint-Petersburg	1441	1744
Russia - Bryansk	803	1027	Russia - Nizhny Novgorod	1470	1801
Poland - Warsaw	812	1015	Denmark - Copenhagen	1485	2017
Czech Republic - Ostrava	841	1153	Finland - Helsinki	1488	2033
Poland - Łódź	864	1116	Germany - Hamburg	1521	1868
B-Herzegovina - Sarajevo	884	1412	Germany - Frankfurt	1530	1964
Lithuania - Vilnius	888	1442	Switzerland - Zurich	1535	2024
Slovakia - Bratislava	890	1225	Sweden - Stockholm	1545	1951
Montenegro - Podgorica	897	1173	Switzerland - Basel	1603	2104
B-Herzegovina - Banja Luka	936	1542	Switzerland - Bern	1623	2144
Czech Republic - Brno	941	1329	Russia - Cheboksary	1624	2043
Lithuania - Kaunas	944	1350	Germany - Düsseldorf	1670	2085
Austria - Vienna	946	1268	Russia - Samara	1671	2433
Albania - Tirana	957	1348	Switzerland - Lausanne	1690	2247
Poland - Wroclaw	975	1257	Russia - Kazan	1708	2195
Russia - Lipetsk	991	1423	France - Nice	1724	2285
Croatia - Zagreb	997	1366	Switzerland - Geneva	1740	2297
Russia - Tula	1012	1528	Belgium - Brussels	1835	2283
Russia - Kaliningrad	1038	1365	Netherlands - Rotterdam	1838	2240
Poland - Poznan	1050	1332	Norway - Oslo	1861	2565
Poland - Gdansk	1089	1356	France - Paris	1981	2527
Slovenia - Ljubljana	1102	1483	Russia - Ufa	2078	
Czech Republic - Prague	1116	1536	Russia - Perm	2200	
Russia - Ryazan	1143	1566			

Annex B.2. Pan-European Transport Corridor IX



Source: Chisinau Wholesale Market Pre-Feasibility Study, Studiocom Italia for the Government of Moldova, Prepared by Ermes Bampa and Dario Caccamisi, Chisinau, 2010

Annex C. List of Packaging Producers

Name of the company, Address	# Phone, Fax	Web sites
COMBINATUL DE ARTICOLE DIN CARTON JSC MD-2023, Chisinau, str.Transnistria, 16	(373-22) fax:472554, tel:470528, 471621, 472544	http://www.kki.md/
CARD BOX PRODUCTION LLC MD-2028, Chisinau, str.Pietrarilor, 2, et.2, 22	(373-22) fax: 208423, tel: 208424, 208426, 208427	
CONVEL-IMPEX LLC MD-2002, Chisinau, sos.Muncesti, 290-A	(373-22) fax: 503219, tel: 571896, mob: (+69) 128875	
DAVAS-NUCAR LLC MD-2023, Chisinau, str.Otovasca, 19	(373-22) tel/fax: 477259, 421376	
DUNAPACK RAMBOX PRODIMPEX LLC, MD-2004, Chisinau, bd.Stefan cel Mare, 200, 111	(373-22) tel/fax: 592370, tel: 753696	http://www.dunapack.ro/
HORN LLC, MD-2023, Chisinau, str.Transnistria, 16	(373-22) fax: 472517, tel: 472553, 472544	
MOLDCARTON S.A., MD-2086, Chisinau, s.Dobrogea, str.Decebal, 15	(373-22) tel/fax: 258131, 258135, tel: 258921	
TRONCO-SVOB LLC MD-2005, Chisinau, str.Feredeului, 4	(373-22) tel/fax: 279249	
AVANGARD LLC MD-2008, Chisinau, str.Ioana Radu, 24, 57	(373-22) fax: 745901, tel: 237550	
RUBIPLAST-COM LLC MD-2071, Chisinau, str.Alba-Iulia, 75	(373-22) tel/fax: 589191, tel: 747867, 589252	

Annex D. List of Equipment Suppliers

N/o	Company	Phone	Fax	e-mail, site	Equipment
1	AGRproFLORA LLC	272658, 079509468	744664		Greenhouses
2	TRANSTENT LLC	525552, 069149440	493028	transtent@rambler.ru	Greenhouses
3	VEGSEM - COM LLC, SEMILEG LLC	272205,211319 , 069102623	211319		Greenhouses
4	MOLDAGROTEHNI CA JSC	231 -20102, 069135460	(231) 43665	p_frunza@moldagrotehnica.md	Greenhouses
5	AGROSERIA - PRIM LLC	29-65-09, 068019993			Greenhouses
6	CMF GROUPE LLC	069694329		andreibuga1980@yahoo.fr	Greenhouses
7	SV LANA LLC	286564, 069290852		5551961@mail.ru	Greenhouses
8	ECOPLANTERA LLC	278464, 548495, 069192236, 069099144	278464,	radulisiiecoplantera@tmg.md	Greenhouses
9	SANIN LLC	407620	411167	marketing@sanin.md	Plastic covers
10	VESARTIS LLC	472788, 069278349	476384	-	Low tunnels
12	AIK LLC	069368586		-	Greenhouses
13	AGROFIT-BONUS LLC	373 22 27-97-36			Greenhouses